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THESIS

TRAINING DEVELOPMENT FOR NEW MATERIEL ITEMS IN ARMY ACQUISITION PROGRAMS

by

Brent Kremer

June 1996

Principal Advisor:

John T. Dillard

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**TRAINING DEVELOPMENT
FOR NEW MATERIEL ITEMS IN
ARMY ACQUISITION PROGRAMS**

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Captain, United States Army
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of the requirements for the degree of

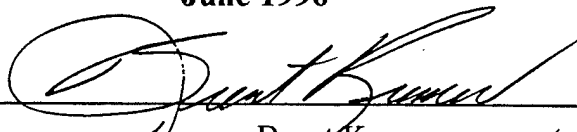
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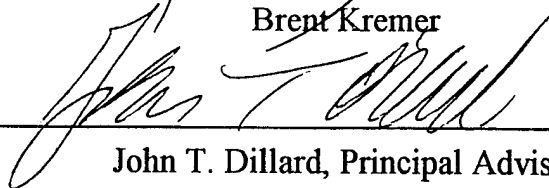
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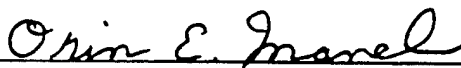


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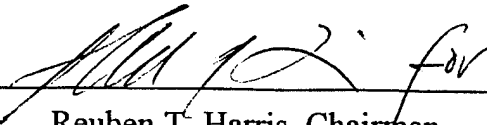
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ABSTRACT

This thesis was undertaken to analyze and document the Army's training development process as it relates to the materiel development of corresponding Army acquisition programs. Training development is a vital necessity for the successful fielding of any new materiel item. The acquisition process in general should not only focus on materiel development management, but on training development management as well. The performance of any weapon system will always be a measure of both how well the equipment is made and how well it is operated.

The study examines current Army doctrine and regulations, and it solicits input from various training development agencies to analyze the training development environment in this era of military reductions. The author's hypothesis was that the Army training development community is being reduced faster than materiel development programs. Interviews with training development personnel, and the results of a survey generated for this thesis support that hypothesis.

Given that training development reductions are outpacing materiel program elimination, the thesis provides two recommendations to reduce the negative impact on training development. One involves use of an automated document suspense management system to increase the efficiency of reduced staffs in training development agencies; the other outlines a potential methodology for procuring contractor provided training development.

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I. INTRODUCTION

A. BACKGROUND

The success of a given Army program is the result of two efforts: the combined work of the materiel development (to include its manufacture), and the proficiency of the "real" soldiers that must use the system. The focus of most Army acquisition programs seems to be on materiel development. Comparatively limited acquisition-specific documentation and guidance is available in the area of training development. The Federal Acquisition Regulations provide thorough guidance for all facets of system's materiel and management and procurement. It could also be argued that indirectly, those same regulations thus provide guidance for a given system's training development. However, the management of materiel development and procurement is a significantly more tangible "thing," and as such, the Federal Acquisition Regulations are written in alignment with that focus.

This lack of Federal policy and guidance should not be construed as meaning that training development is a simple process guaranteed of self-success. In fact, as our weaponry becomes more sophisticated, more complex, and more readily accessible by the common soldier, then the learning process needed to achieve mastery of use of those systems also becomes more difficult. At a Battlefield Digitization conference held at Fort Knox in March, 1995, the two senior ranking attendees emphasized that the major challenge facing implementation of Battlefield Digitization is not technology, but the training and proficiency of the officers, NCOs, and soldiers who will use the equipment. Complicating this situation is the fact that the TRADOC agencies responsible for developing and integrating new training are finding their resources cut back faster than the programs they are required to support.

B. AREA OF RESEARCH

The thesis will focus on the United States Army training development process as it relates to new materiel item development. The thesis will examine current processes and procedures used to develop and modify personnel training for both newly developed

materiel items and equipment being modified or improved. Materiel development processes have specific documentation and control procedures utilized by both the contractor and the program manager. The thesis will identify the timeliness, documents, procedures, and milestones necessary for training development of corresponding matériel items.

C. RESEARCH QUESTIONS

1. Primary Research Question

How is training development currently integrated into/with materiel development? In other words, how does a proponent accomplish training development concurrently with materiel development and does the process have the potential to achieve greater efficiency?

2. Subsidiary Research Questions

a. What is the "optimal" point to address various training issues with respect to the life cycle of a given materiel development item?

b. How can commercial contractors provide more assistance in the training development process?

c. To what extent has the personnel strength been reduced in training development organizations in TRADOC and how (if at all) has this affected the timeliness, efficiency, and quality of their work?

d. Has the number of materiel development items decreased proportionally to the decrease in training developers?

D. SCOPE OF THESIS

The study will examine all available Army regulations and guidance, to include policy developed and used exclusively at the U.S. Army Armor Center, to ascertain the precise training-specific documents, milestones, objectives, and goals essential for successful acquisition efforts. The thesis will cover only those training development issues that begin with the formulation of an approved Mission Needs Statement (that requires the development of a new materiel item), and end with First Unit Equipped

(FUE). Only those training issues required to be tracked or produced by the Combined Arms Training Strategies (CATS) agencies under TRADOC will be examined.

E. METHODOLOGY

The U.S. Army Armor Center will serve as the sponsor of this thesis. Through personal interviews with CATS personnel and a thorough examination of Army training development related regulation, guidance, and policy, the training development process for new materiel items will be documented. Questions and pertinent issues that arise from this examination will be used to survey other training development agencies to identify current effectiveness concerns. In support of the U.S. Army Armor center, A product of this thesis will be the development of a prototype of an automated system that will assist the CATS agencies in managing their training development efforts for new materiel systems.

F. BENEFITS OF STUDY

This thesis is the first documented research effort in the area of training development in the Army acquisition arena. It will serve as a basis for future research and discussion of training development for new materiel items.

G. ORGANIZATION

This thesis consists of the following eleven chapters:

Chapter I - Introduction: this chapter provides the background, scope, methodology, and organization of the thesis.

Chapter II - Training Development Process Overview: this chapter introduces the training development process and provides a general overview of the systems that will be examined. It provides a basic framework of understanding and introduces key elements of the Army's training development system.

Chapter III - Combined Arms Training Strategy (CATS): this chapter discusses the concept of CATS and how it functions within the training and materiel development process.

Chapter IV - Systems Approach to Training (SAT): this chapter explains how the SAT process is applied to training development.

Chapter V - Training Requirements Analysis System (TRAS): this chapter discusses TRAS and its training development product outputs.

Chapter VI - System Training Plan (STRAP): this chapter investigates the process of how the STRAP is developed and discusses its contents in detail.

Chapter VII - Training Development and Materiel Actions and Interactions: this chapter demonstrates the various training development analysis processes and documentation interfaces that occur at each milestone for a new materiel item. The Command and Control Vehicle (C2V) is used as an example of the analytical process executed by training developers throughout the materiel development process.

Chapter VIII - Survey Results: This chapter provides the results of the training development survey conducted in support of this thesis.

Chapter IX - Recommendations for Pertinent Survey-revealed Problems: this chapter presents two potential solutions for key problems revealed by the analysis of the survey of Chapter VIII.

Chapter X - Conclusion: this chapter summarizes the results of the research, answers the research questions, and presents suggested areas for further research.

II. TRAINING DEVELOPMENT OVERVIEW

A. INTRODUCTION

This chapter provides an overview of the training development process the Army follows. It introduces the key training development processes and systems that will be discussed in greater detail in subsequent chapters. The combat developer must understand how the Army determines its training requirements for the present and for the future. He must also know how and when he interacts with his training development counterparts.

The Army determines training requirements through the interaction of the Combined Arms Training Strategy (CATS), the Systems Approach to Training (SAT), and the Training Requirements Analysis Systems (TRAS). Together, these three subsystems documented by the System Training Plan (STRAP) set the basis for establishing or changing all Army training as it relates to new materiel items. Their range of application extends from the institutional level where initial and follow-on career training is conducted in an academic environment, through the unit and individual soldier levels. [Ref. 13]

Training is a critical component of creating a functional capability on the battlefield. Without it, the most sophisticated weapon systems in the world are only so much expensive hardware. Generating a complete system requires that the Army employ what is called the Doctrine, Training, Leader Development, and Organizational and Materiel Solutions Focusing on Soldiers (DTOLMS) skill set. The United States Army Logistics Management College (13) defines a complete system as "an integrated system manned by the appropriate personnel who are trained with the right skills, based on sound doctrine." From the Army's perspective, ensuring the success of the future application of training involves employing a methodology that determines what needs to be trained, how the training is to be developed, how the training is to be resourced, how the requirements of the system are identified, and what impact the new doctrine and systems will have on leadership development. [Ref. 13]

B. COMBINED ARMS TRAINING STRATEGY

The Combined Arms Training Strategy (CATS) is the Army's current and future training development and training management tool. Its part in the Training Development Process is to

train and sustain the total force to standard in the institution, in the unit, and through self-development in order to support the post-Cold War force projection Army. [Ref. 9]

CATS plays a large role in the process of identifying all training required to be accomplished, as well as quantifying and justifying the training resources required to execute the training. Quantifying and justifying resources are not synonymous with selecting and acquiring resources. Included in this resource identification function is selecting the training locations with the resources required to support training on specific collective missions. Examples of such areas are the National Training Center (NTC) and the Joint Readiness Training Center (JRTC) [Ref. 9].

CATS enables the Army to integrate and manage Army training wherever it occurs and to identify the associated training resource requirements for the total Army. More than anything else, CATS is a management tool used to integrate Army training at several different levels. It also identifies the associated training resource requirements for the total Army. CATS is intended to be a flexible system which will not limit leaders when the derived strategies are employed, but will instead provide a menu of training events and resources for them to use. [Ref. 9]

CATS functions as the driving force for training resource development, procurement, and management. This function requires a close liaison between training developers and combat developers to ensure that changes in DTOLMS are integrated into the appropriate training strategies at an early stage. This liaison ensures that all systems work properly. [Ref. 9]

C. THE SYSTEM TRAINING PLAN

The baseline document for developing training is the System Training Plan (STRAP). Combat developers and training developers on the Integrated Logistics Support (ILS) and MANPRINT working groups begin establishing the training requirements in Acquisition Phase 0 of the Life-Cycle Systems Management Model. Upon approval of the MNS, the proponent school for the system begins writing the initial STRAP. A proponent school is defined as the Training and Doctrine Command (TRADOC) school designated by TRADOC commanding general to exercise supervisory management of all combat/training development aspects of a materiel system [Ref. 16]. The proponent must complete and obtain approval for the initial

STRAP prior to Milestone I. As the system develops, updated STRAPs must be approved prior to Milestones II and III. [Ref. 13]

The STRAP identifies entirely new subjects, skills, or tasks to be trained or incremental changes in training based on changes in combat developments. For new materiel items, institutional training must be in place in time to have trained personnel available for FUE. [Ref. 13]

D. THE TRAINING REQUIREMENTS ANALYSIS SYSTEM

The Training Requirements Analysis System (TRAS) is a long-range resource management process designed to assure timely programming of the Army institutional training infrastructure (centers and schools). TRAS integrates the Systems Approach to Training (SAT) with the Planning, Programming, Budgeting, and Execution System (PPBES) by documenting training strategies, courses, and related resource requirements [Ref. 8]. Working with CATS and SAT, it identifies training resources required to develop and implement training for each MOS, SC, or separate functional training program [Ref. 15]. The purpose of the TRAS is to ensure that, as required by current and future proponent Combined Arms Training Strategy (CATS) institutional strategies, students, instructors, facilities, ammunition, equipment, manpower, and funds are all at the right place and time to accomplish TRADOC's mission, and that the instruction produced is consistent with TRADOC and Army training requirements. [Ref. 8]

E. THE SYSTEMS APPROACH TO TRAINING

SAT is an orderly process for gathering and analyzing data about collective and individual performance. It uses five sequential steps that consist of performance evaluation, skills analysis, task design, training development, and training implementation to determine the who, what, when, where, why, and how of training [Ref. 17]. It constitutes the body of tools the Army uses to revise existing programs and starts the development of new training programs. [Ref. 13]

SAT is used to develop training alternatives to shortfalls identified through the Concept Based Requirement System (CBRS). Under the umbrella of CATS, SAT can be used to analyze all aspects of training conducted in the Army. It ensures standardization in training. SAT begins

the process that changes Soldier Training Publications (STPs), training devices, and training methods and materials. [Ref. 13]

F. TRAINING STRATEGY DEVELOPMENT

1. Overview

The Army uses an integrated training strategy in concert with the combined arms training strategy for a system to provide a detailed description of how Military occupational Speciality (MOS) and Special Skill Identifier (SSI) proponents intend to train the system in the institution and units. The employed methodology of this combined strategy begins with basic and advanced individual training and extends through the advanced noncommissioned officer courses (ANCOCs) for enlisted soldiers. For officers, it begins with the officer basic courses (OBCs) and extends through senior level service schools. Detailed information for each affected MOS/SSI is provided in appropriate annexes to the STRAP. [Ref. 16]

The MOS/SSI proponent has the responsibility of developing the most cost effective training strategy to support the system. All schools use this strategy to train soldiers on the system. It includes the consideration for the use of embedded training capabilities, stand-alone Training Aids, Devices, Simulations and Simulators (TADSS). If a remote training center conducts the training, the MOS/SSI proponent identifies the necessary training equipment and training devices to support that training. Proponents then coordinate with the training centers to ensure that resources are programmed to conduct training. [Ref. 16]

System proponents develop a training strategy for systems designed for the general purpose user/operator in the same manner as described above. If extension training is the selected alternative to train operators, proponents must consider two key considerations. First, an effective extension training strategy requires a subject matter expert to implement it (which may require institutional training in officer and noncommissioned officer courses). Secondly, the training strategy used to sustain the system should be similar to the New Equipment Training (NET) strategy for the system when initially fielded. NET should not be required to field the system if it requires no institutional training. [Ref. 16]

Proponents use the Combined Arms Training Strategy (CATS) to assist in the development of an integrated training strategy for a system. [Ref. 16]

2. Doctrine and Tactics Training.

The system proponent develops the initial Doctrine and Tactics Training (DTT) strategy for inclusion in the STRAP to support Milestone Decision Review (MDR) II. DTT is addressed in the training concept paragraph of the updated STRAP. The proponent must have a mature DTT strategy available to support training test players for the Initial Operational Test & Evaluation (IOT&E). An abbreviated version of the DTT strategy is provided to the materiel developer for incorporation into the NET plan. [Ref. 16]

The DTT provides the tactics, techniques, and procedures for operators through senior commanders. This training allows them to exploit the new capability of the system and improve combat effectiveness. The DTT strategy includes how to provide training during fielding and sustainment of the system. The following factors are considered in developing a DTT strategy [Ref. 16]:

- Changes to current doctrine, tactics, techniques and procedures.
- Changes to current organizations caused by the system.
- Complexity of the system's operation.
- Number of personnel to be trained.
- Resource constraints.

The United States Army Combined Arms Center (USACAC) at Fort Leavenworth, Kansas, approves the DTT for a system. However, part of a complete DTT strategy may require the Major Subordinate Command (MSC) to provide DTT. For example, changes to command and control concepts or logistics concepts would cause a need for MSC DTT. In that case, the MSC is responsible for providing resources for this portion of the DTT strategy or ensuring that the proponent can provide the necessary training. [Ref. 16]

The ideal method to provide DTT is in the training institution (i.e. the "Branch Schools"). If this method is not appropriate, exportable training materials are considered as an alternative method. The least desirable method is training by a NET team. [Ref. 16]

G. CONCLUSION

This chapter provided an overview of the training development process. It introduced a number of terms and processes that will be discussed in greater detail in subsequent chapters. Of

key importance to this study is the interaction of the CATS, SAT, TRAS, and STRAP. To illustrate their interrelationships, the following analogy is provided for clarity. Achieving a complete, fully functional training package is the ultimate destination for the training development process. Within the training development environment, CATS provides the direction and control for developing the training approach, conducting the analysis, and documenting all pertinent issues. The STRAP is a “road map” or “trip plan” developed by CATS agencies to provide direction for the training development. SAT is the means of conveyance that provides a methodology for the development to progress. TRAS identifies the requirements needed to ensure that training development progresses without unforeseen distractions or detours in a timely manner. This analogy is shown in Figure 1.

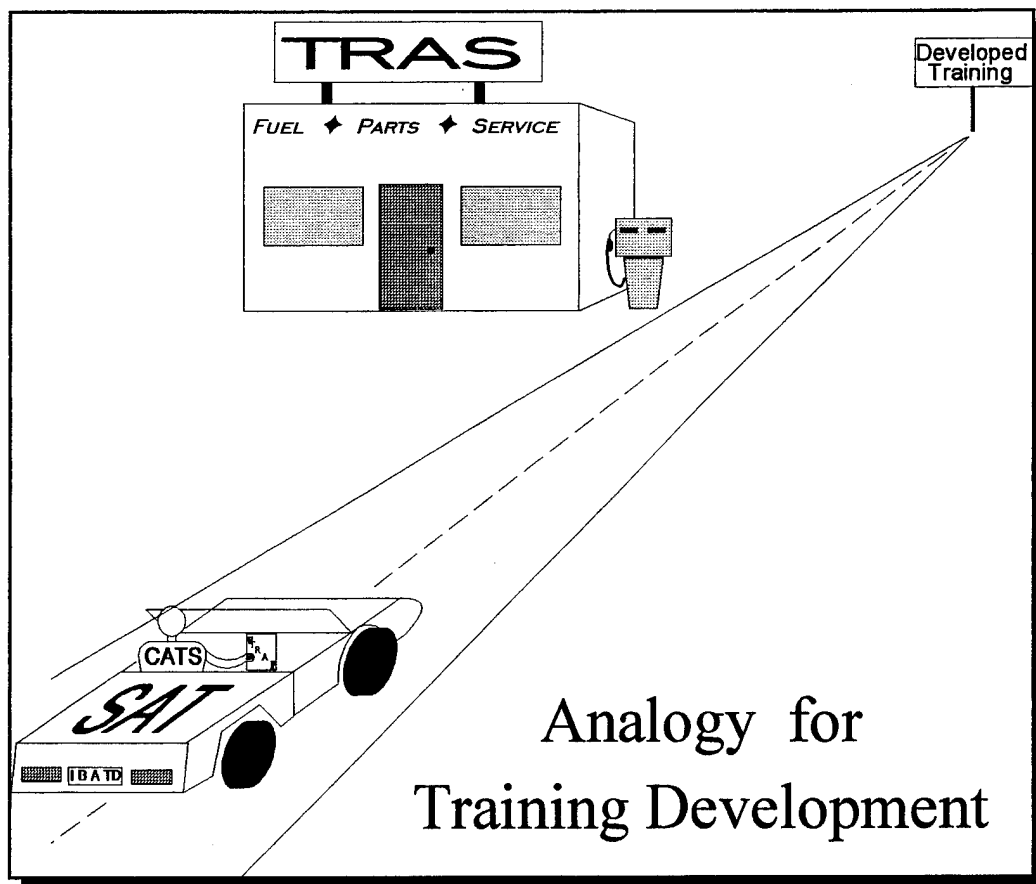


Figure 1. Training Development Analogy

III. COMBINED ARMS TRAINING STRATEGY

A. INTRODUCTION

This chapter presents a thorough discussion of the Combined Arms Training Strategy (CATS) concept. CATS provides direction and control of the training development process. In the analogy presented in Chapter II, CATS is the "driver" of the training development process. There are different types and categories of CATS' strategies, and in this chapter they are presented and defined. CATS input to a variety of analyses, plans and processes are also introduced, serving as an overview of the Training Development / Combat Development interface which will be discussed in greater detail in Chapter VII.

B. CATS OVERVIEW

CATS is designed to support the training of a Force Projection Army. It is the Army's overarching strategy for the current and future training of the force. It defines how the Army will train and sustain the total force to standard in the institution, unit, and through self-development, to support the post-Cold War Force Projection Army. [Ref. 9]

CATS also identifies, quantifies, and justifies the training resources required to execute the training. This includes ensuring that relevant practice fields which replicate the battlefield with high realism are available to the Force Projection Army. These "practice fields" are training locations with the resources necessary to support training on specific collective missions. Examples of these training areas include the National Training Center, the Joint Readiness Training Center, and the Jungle Training Center [Ref. 9].

CATS enables the Army to integrate and manage Army training wherever it occurs, and to identify the associated training resource requirements. It also provides a foundation to identify, develop, acquire, and manage training resources for the total Army. CATS provides direction on how the force trains and identifies a recommended mix of training resources to execute the training. [Ref. 9]

Proponents design CATS following the principles established in TRADOC Regulation 350-35, Army Field Manual (FM) 25-100, FM 25-101, and the applicable mission training plans (MTPs). These proponent-designed training strategies are tools which identify proposed sequences of training events (including the associated tasks, skills and resources) for Tables(s) of Organization and Equipment (TOE) unit commanders. TOE units are those that are expected to deploy to a combat environment in performing their mission. CATS also defines a sequence of training events for institutional training conducted by Table(s) of Distribution and Allowance (TDA) commandants and commanders whose agencies and organizations perform "fixed station" administrative functions. These strategies serve as a proponent's plan for training the events, tasks, and skills, which are required by a proponent's training strategy by deciding which tasks and skills are to be trained in the institution, and which are to be trained at the unit. Proponents consider joint and combined implications when developing strategies. [Ref. 9]

Strategies ensure the appropriate integration of training resources for armored, light, and special operations forces of both Active Components (AC) and Reserve Components (RC). As stated previously, CATS is intended to be a flexible system which does not limit leaders, but provides them with a menu of training events and resources from which they can plan and manage training. [Ref. 9]

CATS also serves as the driving force for training resource development, procurement, and management. This function of CATS requires a close liaison between the training development community and the combat development community. This is to ensure that potential doctrine, training, leader development, organizational, and materiel solutions focusing on soldiers identified within the combat development process are integrated into the appropriate training strategies at an early stage. This liaison is needed to provide adequate and timely training and leader development, and allow the necessary time for the materiel acquisition system to work properly. [Ref. 9]

C. CATS CATEGORIES

CATS focuses on two distinct categories of strategies affecting different time frames: current and future. Current institutional, unit, and self-development strategies are baseline strategies which describe how the Army trains now. Current strategies apply to the budget and execution years of the budget process [Ref. 9]. Current strategies are based on the following factors [Ref. 13]:

- Current threat and capability requirements;
- Mission;
- Doctrine;
- Organization and training resources such as Operational Tempo (OPTEMP), ammunition, training land and ranges, facilities, and Training Aids, Devices, Simulators, and Simulations (TADSS).

Future strategies reflect changes in the mix and type of training resources needed to maintain combat superiority given changes in the threat, technology, budget, force capabilities, and mission of tomorrow's Army [Ref. 9]. Future strategies are intended to affect the period from the end of the current Program Objective Memorandum (POM) window forward at least ten years into the future (i.e., through the second year of the Extended Planning Period of the budget process). They require the training developer to make early decisions based upon projected requirements and emerging concepts. [Ref. 13] The CATS Model and its time relationship with the budget process cycle are depicted in Figure 2.

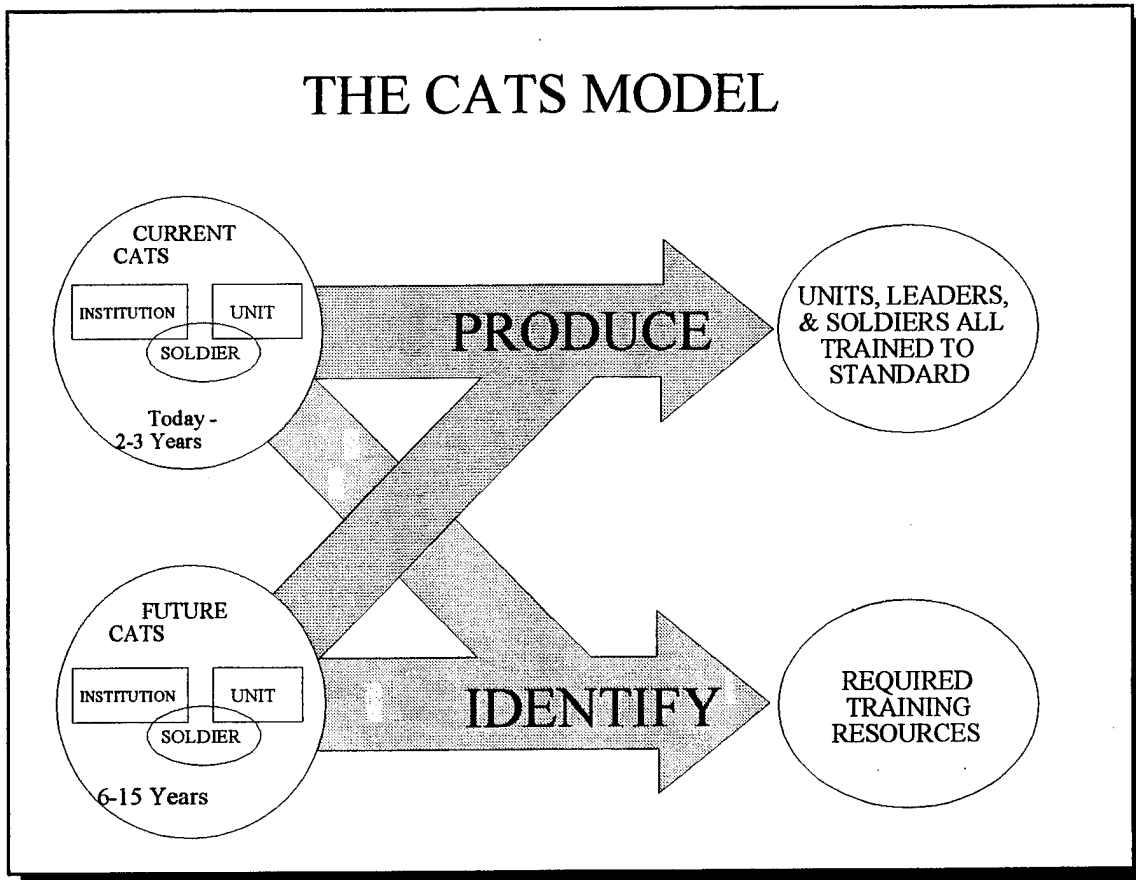


Figure 2. CATS Model [Ref. 9].

D. CATS STRATEGY TYPES

CATS currently consists of three separate but integrated strategies described as follows [Ref. 9]. As briefly discussed in the previous chapter, these are *unit*, *institutional*, and *self-development* strategies. These strategies dove-tail with the identically named "pillars of training [Ref. 13]". All three will be described from a CATS perspective, and are depicted in Figure 3 which follows.

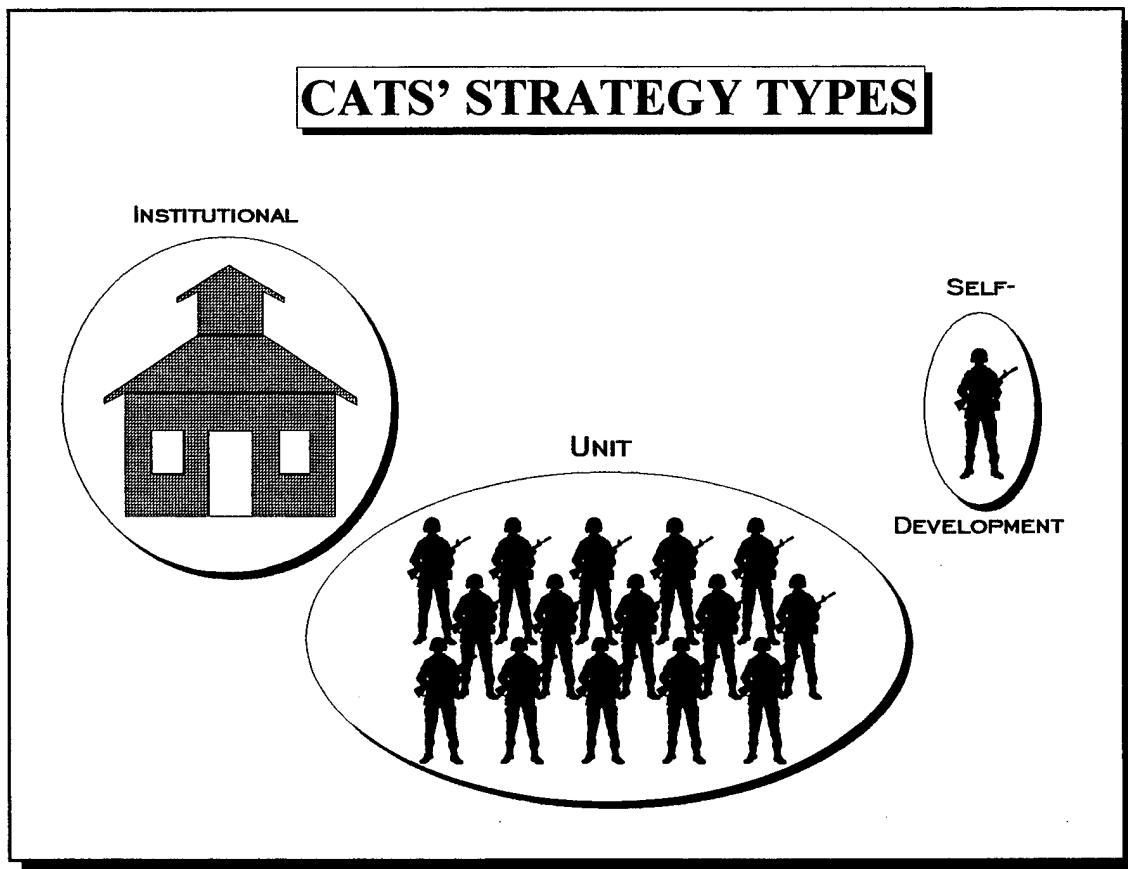


Figure 3. CATS Strategy Types.

1. Unit Strategies

Unit strategies depict the recommended training an Army combat unit (also known as a Table of Organization and Equipment, TO&E, unit) should conduct annually to maintain readiness, and it lists recommended resources to conduct such training [Ref. 13]. These strategies are designed to sustain trained and ready units, and not cause cyclic peaks and valleys in readiness. Commanders do not have to strictly adhere to this unit training strategy. The strategy serves as a training menu and each commander must compare his unit's training strategy with the unit's Mission Essential Task List (METL), level of training readiness, OPTEMPO limitations, and other available training resources (to include time), to determine the best way to manage training for his unit. [Ref. 9]

Proponents prepare unit strategies in the form of a gunnery, maneuver, collective, and soldier matrix. Combined Arms units use gunnery matrices to display their weapons systems training requirements, and maneuver matrices to display their maneuver (non-gunnery) requirements. Those Combat Support and Combat Service Support units that lack major weapons systems do not have gunnery matrices (infantry gunnery strategies are used for individual and crew served weapons), but use collective matrices which are nearly identical to maneuver matrices, to display the training events to be conducted and the given unit's base item of equipment. Proponents also produce a soldier matrix to identify individual training that should be conducted in the unit. Soldier strategies reflect individual skills and tasks that unit commanders must ensure his soldiers can accomplish to support the unit mission. [Ref. 9]

Matrices also indicate critical gates, determined by proponents, which should be successfully completed before a more difficult, complex, dangerous, or expensive training event is attempted. The key point of all these matrices is that the proponent determines what events, gates, frequencies, and required training resources are depicted on the matrix. [Ref. 9]

2. Institutional Strategies

Institutional strategies display the exact requirements for training soldiers to standard within the institution. These strategies are documented in the Individual Training Plan (ITP), Course Administrative Data (CAD), and the Program of Instruction (POI) for each MOS or specialty [Ref. 13]. Institutional training resources are regulated through the Training Requirements Analysis System (TRAS) in TRADOC Regulation 351-1.

Institutional training using these strategies must start in sufficient time to provide trained replacements for the First Unit Equipped (FUE) suspense date. As a goal, institutional training should start at FUE, but not later than one year after FUE. Proponent schools plan for small classes initially and gradually "ramp up" to support the number of systems in the field. Concurrently, the proponent schools gradually reduce the student load in courses for replaced system. [Ref. 16]

3. Self-development Strategies

Self-development strategies exist in two forms: the NCO Self-Development Career Map for enlisted soldiers and the Military Qualifications Standards (MQS) system for officer [Ref. 13].

E. CATS INTERFACE WITH ARMY PROCESSES

CATS is designed to interface with existing Army processes to include: combat developments, the materiel acquisition process, budget process, SAT and TADSS development [Ref. 9]. These interfaces will be discussed first, and depicted graphically at the close of the section.

1. Combat Development Interface

a. General

The Army uses the Combat Development Process to determine its war-fighting requirements. This threat and capability driven process is how TRADOC accomplishes what it calls its "Architect of the Future" mission. Future CATS describes the training required to produce a force capable of executing these missions. The above statements show a clear relationship between the combat development process and future CATS. The combat development process generated requirements, along with the proponent unique requirements (not produced by the combat development process), are the foundation of future CATS. CATS is the umbrella, under which occurs the translation of training and leader development requirements into training strategies (and the associated training resource requirements). [Ref. 9]

These strategies, in turn, provide input which supports the combat development process and the Army materiel acquisition process. Training developers and combat developers must ensure that they have a solid understanding of the combat development process, SAT, CATS, and their relationship to each other, to ensure their complementary support in identifying solutions required to meet future Army operational and training requirements. Future training strategies should have an impact on the following documents used in the materiel acquisition process as discussed further. [Ref. 9]

b. The Operational Requirements Document

The CATS development process begins with the approval of the Operational Requirements Document (ORD). The ORD is a general description of the operational capability, the type of system proposed, and concepts for operation and support. Training support for the proposed system is addressed in the ORD. The proponent's future training strategy provides an information resource from which training support information may be obtained. It is imperative that combat developers and training developers work together closely, to ensure the training support information provided in the ORD and the future CATS is compatible. [Ref. 9]

c. The Systems Approach to Training

When the ORD has been established or a training deficiency has been identified, the process then moves into the Systems Approach to Training (SAT) process. In SAT, the Army determines the "what, when, where, and how" of required training. The resources to be used in the training are then documented during the Training Requirements Analysis System (TRAS) process. When the training plan has been established and the resources are documented, the plan then proceeds into the Planning, Programming, Budgeting, and Execution System (PPBES) in order to determine if adequate funding exists. [Ref. 13]

d. The System Training Plan

The System Training Plan (STRAP) is the master training plan for a new system. It outlines the total training strategy to be used to develop and integrate the item into the training base and gaining units. It plans for the necessary training support, products, and courses. It sets milestones to ensure the accomplishment of the training strategy for the system. The proponent uses the CATS' current and future training strategies as key elements in the development of the STRAP. A primary objective of the STRAP is to identify all training resource categories that will be required to execute the future training strategies, affected by the new item. [Ref. 9]

e. Cost and Operational Effectiveness / Cost and Training Effectiveness Analysis

The Cost and Operational Effectiveness Analysis (COEA) compares costs and effectiveness among alternatives to meet a specific requirement. The Cost and Training Effectiveness Analysis (CTEA) compares costs and effectiveness among training alternatives in support of a COEA. Applicable current and future training strategies are a basis for the TRADOC agencies conducting a COEA or CTEA to use for training related considerations. These strategies, when coupled with other training data, will assist the analyst in the development of the COEA or CTEA. Current and future training strategies accomplish the following two goals [Ref. 9]:

- Identification of specific requirements for analysis so agencies can better focus resources to obtain data and compare alternatives.
- Provide training resource data at key decision points. Quality data is critical to assist Army senior leaders in developing priorities for training resources.

f. The Test and Evaluation Master Plan

The TEMP contains critical operational issues and criteria, results of previous testing, descriptions of subsequent planned testing and environmental issues relating to a new system or piece of equipment. As future training strategies evolve into current training strategies, the ability to develop the training portion of the TEMP for a unit equipped with a new system is enhanced. Future training strategies allow early development of the training section of a TEMP, and provide a clearer picture of the emerging test requirements and design. The TEMP assists in validating the proponent's training strategy for units equipped with the new system. [Ref. 9]

g. New Equipment Training Plan /Displaced Equipment Training Plan

The New Equipment Training Plan (NETP) describes the training requirements for the integration of a new item of equipment into the Army inventory. Development of the NETP must be based on the applicable future training strategies. Conversely, future training strategies may need to be modified to accommodate the

training of individuals and units on a new system as conducted by NET training. CATS will facilitate early identification of training resource requirements to support new equipment training (NET). CATS works in a similar fashion regarding Displaced Equipment Training (DET). [Ref. 9]

2. CATS Interface with the Budget Process

Headquarters, Department of the Army (HQDA), uses the budgeting process to address national military strategy and policy, military force objectives and capabilities, and to justify and allocate the resources necessary to execute the Army mission. A key portion of the budget process is the POM which details allocation of forces, manpower, and funds for a six-year POM period. CATS provides a foundation for quantifying and justifying required Army training resources which feed into this budgetary process. [Ref. 9]

Future CATS identify how the Army plans to train and the resources required to execute the training during and after the late POM period. Future strategies are based on future doctrine and operational concepts, with their projected Tactics, Techniques, and Procedures (TTP), and identify events, tasks, and skills to be trained. These strategies enable proponents and integrating commands to develop a prioritized list of training resource requirements. This list, resulting from TRADOC guidance, assists the Army in determining the priority for applications of funds based on the resource's contribution to training the force. The CATS parallel relationship with the budget process cycle is depicted in Figure 4.

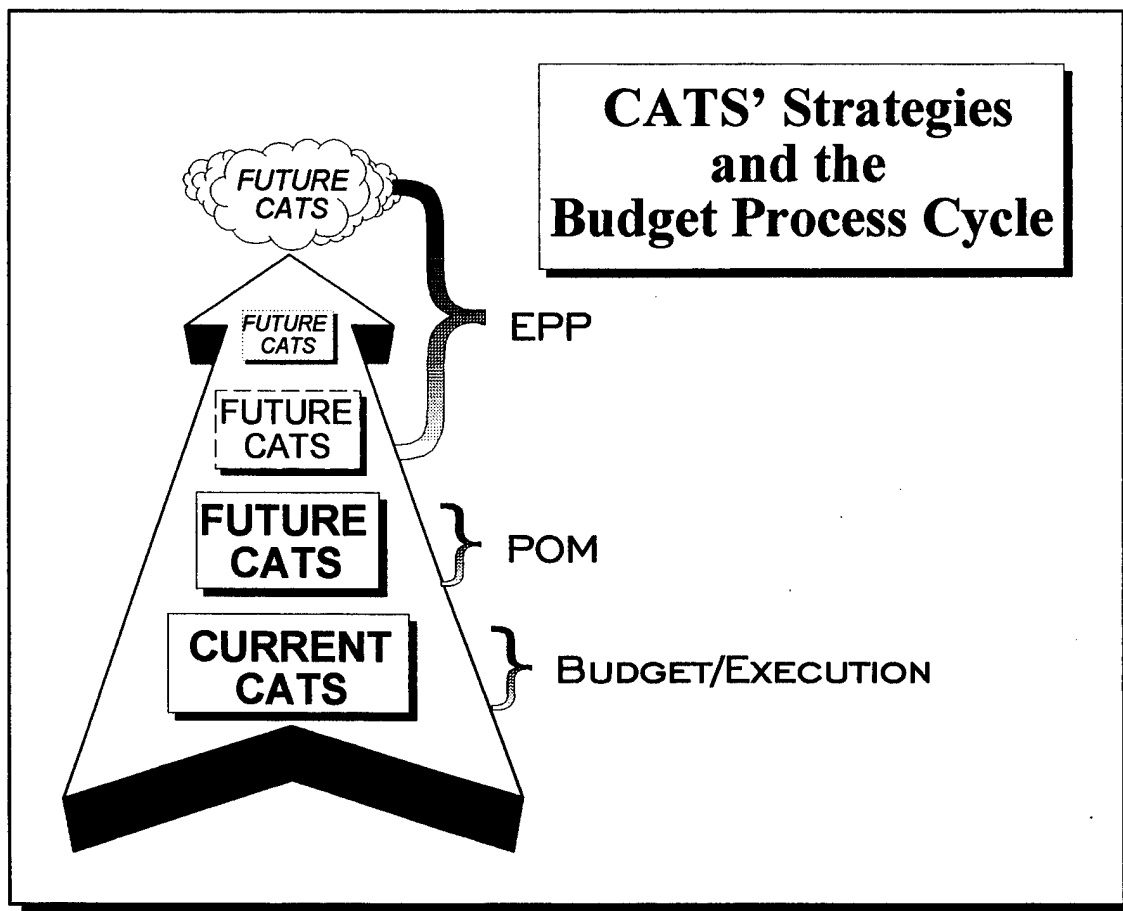


Figure 4. CATS' Strategies & the Budget Process Cycle [Ref. 9].

The sequential process of training resource requirement prioritization can be summarized as follows [Ref. 9]:

- Proponents update current and future strategies and prioritize training resource requirements for submission to the appropriate integrating command.
- CASCOM integrates strategies and prioritizes a consolidated list of training resource requirements for Combat Service Support proponents. These are then submitted to the Combined Arms Center.
- The Combined Arms Center, as the organization responsible for training resource requirement prioritization, accomplishes the following:
 - Integrates proponent strategies and prioritizes a consolidated list of training resource requirements.

- Staffs integrated strategies and prioritized training resource requirements lists with Major Army Command (MACOM) Commanders/Commanders-in-Chief (CINCs).
- Incorporates MACOM/CINC comments into strategies and the prioritized training resource requirements list, and forwards them to proponents.
- Hosts an annual Director of Training and Doctrine (DOTD) conference for proponents to receive strategy guidance, review strategy integration, and review and discuss training resource requirements prioritization.
- Reaffirms integrated strategies and training resource requirements priority list.
- A General Officer Working Group (GOWG) for the training mission area (TMA) provides general officer oversight on the priorities submitted for funding.

This process is graphically depicted in Figure 5.

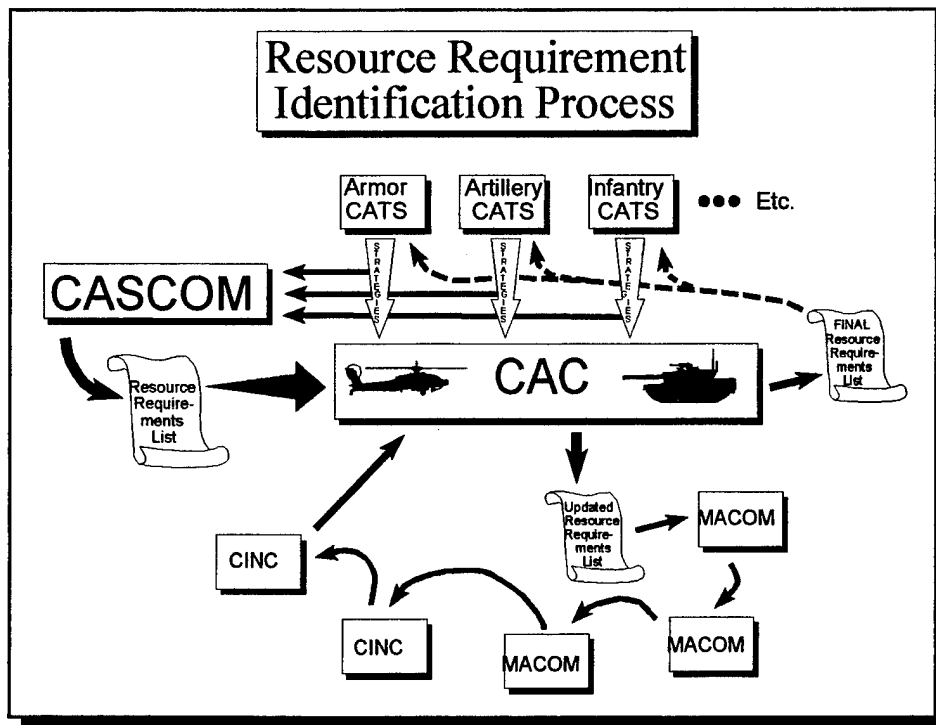


Figure 5. Resource Requirement Identification Process.

3. CATS Interface with SAT

SAT is a process for effectively determining what, when, where, and how tasks should be taught. It is a process that consists of five interrelated phases: evaluation, analysis, design, development, and implementation. The SAT process works under the umbrella of CATS, aiding in the development of training strategies. Application of the analysis and design phases assists proponents in the development of their training strategies. The evaluation phases must look at how well current strategies meet the needs of the field, and what changes should be addressed in future CATS. [Ref. 9]

4. CATS Interface with Train Aids, Devices, Simulators, and Simulations

Training Aids, Devices, Simulators, and Simulations (TADSS) are developed to provide support across the entire training spectrum. Future CATS are the basis for justifying the development and acquisition of new TADSS. If a TADSS is not funded, strategies will require modification. Proponents must demonstrate how the new TADSS will support their future training strategies, and where appropriate, identify trade-offs of training resources (i.e., OPTEMPO, ammunition, etc.) in order to obtain funding for the TADSS. This ensures that the training strategy drives the acquisition of the TADSS, instead of having to redesign training strategies, because a device or simulation has been procured prior to documenting a need for it. Future strategies, along with future war fighting concepts, assist in writing the ORD for systems and non-systems training devices. These strategies provide the rationale for the requirement for the device, its concept of use, and assist in justifying its procurement. [Ref. 9]

5. CATS' integration and relationships with the above discussed processes are graphically summarized in Figure 6.

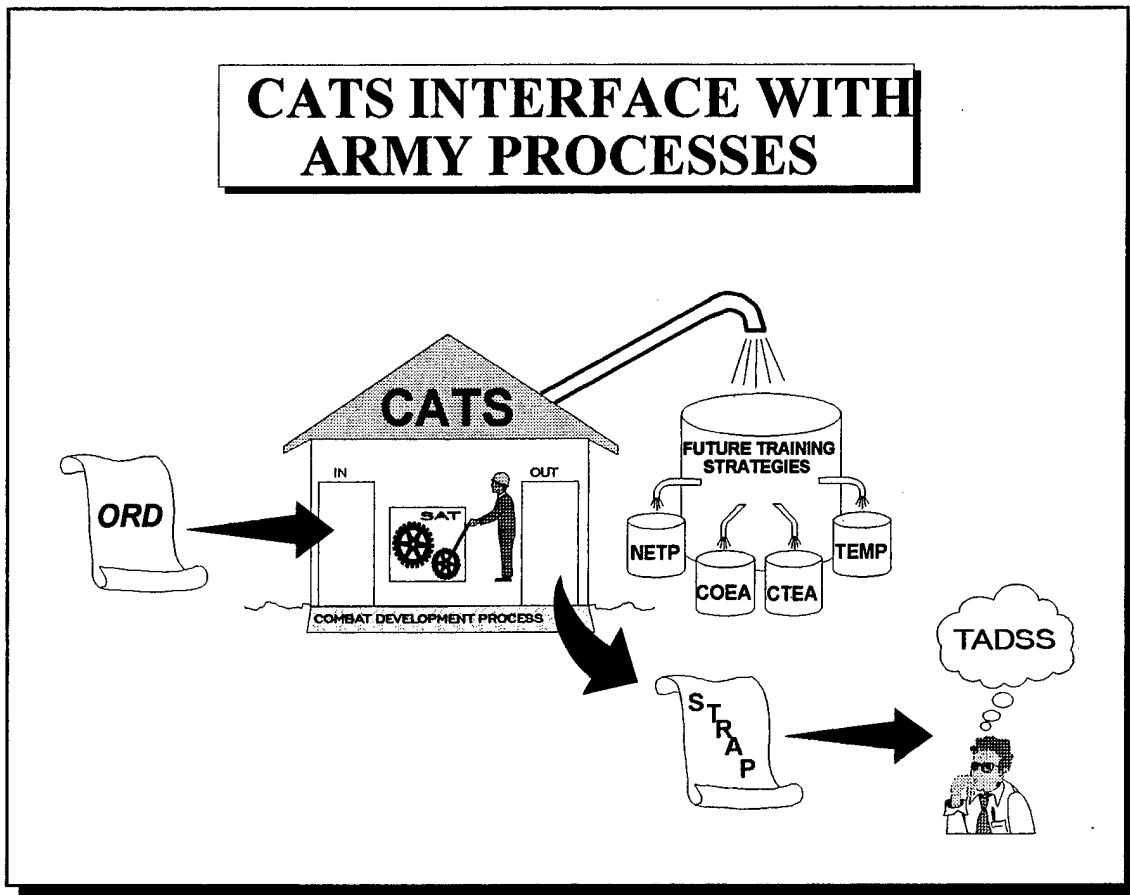


Figure 6. CATS' Processes.

F. SUMMARY

CATS strategies are varied and far reaching. Training touches every uniformed soldier and must be carefully integrated with a variety of processes to ensure that it is effective and in consonance with the Army's ever changing mission. This chapter defined the different types and categories of CATS strategies. It also identified the various methods and process that require CATS interaction throughout the life of a program beginning with the ORD, progressing through the PPBES process, and continuing in post deployment actions. In subsequent chapters, other training development systems are examined that support process derived by CATS agencies.

IV. SYSTEMS APPROACH TO TRAINING

A. INTRODUCTION

The Systems Approach to Training (SAT) is an orderly process for gathering and analyzing data about collective and individual performance. It uses five sequential steps (evaluation, analysis, design, development, and implementation) to determine the “who, what, when, where, why, and how” of training [Ref. 17]. It constitutes the body of tools the Army uses to revise existing programs and starts the development of new training programs. [Ref. 13]

SAT is used to develop training alternatives to shortfalls identified through the Concept-based Requirement System (CBRS). Under the umbrella of CATS, SAT is used to analyze all aspects of training conducted in the Army. It ensures standardization in training. SAT begins the process that changes Soldier Training Publications (STPs), training devices, and training methods and materials. [Ref. 13] In the analogy presented at the close of Chapter II, SAT is the conveyance by which CATS agencies achieve the end result of training development.

B. SAT PHASES

The five sequential steps listed in the first paragraph are inter-related processes which are phased. These phases are: Evaluation, Analysis, Design, Development, and Implementation. The outputs to each phases represent the inputs to one for more subsequent phases [Ref. 17]. These process will be described in detail, however, the *general* SAT process involves the conducting the following actions [Ref. 13]:

- Identifying and analyzing the task(s) performed in the duty position and the soldier's required behavior;
- Designing training objectives to produce the required output and behavior;
- Developing training programs and materials to achieve these objectives;
- Implementing or conducting training;
- Evaluating training graduates based on criteria referenced testing.

In this chapter, each of the five phases will be examined in detail to decompose the SAT process. The chapter will conclude with a discussion of pertinent Army information and doctrine management systems that influence the SAT process.

1. Evaluation Phase

Evaluation in this context is defined as a “needs assessment” of the quality of training. It determines the current technical proficiency and competency of soldiers, leaders, and their units. It also determines whether units can function cohesively and competently in joint and combines arms operations [Ref. 17]. Feedback from all levels is the single most important factor in the evaluation process. Evaluation includes a needs assessment to determine whether the required solution lies in a change to training or if it requires implementation of some other action. This assessment should take into account any changes in threat, doctrine, missions, organizational structure, material, specialty structure, or manpower constraints, including those changes that may result from the CBRS process (which may generate a number of these changes by itself). [Ref. 13]

Training is not always the solution to performance deficiencies. Needs assessment is a means to determine whether it is or not. Assessment must enable the unit or institution to view an entire training event (Field Training Exercise, briefing, Skill Qualification Test, etc.) and allow leaders and developers to identify possible shortcomings. A needs assessment requires input from training developers, combat developers, subject matter experts (SMEs), instructors, task performers, and their supervisors. A needs assessment should confirm or reject the hypothesis that a change in training can correct the identified deficiency. [Ref. 13]

A needs assessment produces a number of critical pieces of information. Of highest importance is its function to document all facts that impact on a given problem, identifying the cause, or potential cause, of a training deficiency. The needs assessment produces a statement of the problem in which it describes the shortcoming with any quantitative measurable data. This assessment could then lead to referring the problem to some other office, agency, or action officer who may be better qualified or hold the proper responsibility for acting on the statement of conclusions produced by the

assessment. The needs assessment should also highlight the difference between the desired and currently forecasted outcome of the established training plan (i.e., the difference between what is needed and what is expected to happen should the anticipated problem not be corrected). Finally, it lists all possible solutions identified and recommends the best possible solution. [Ref. 13]

Training developers must develop an assessment plan that is versatile and can be used for training management. It should address overall evaluation methodologies, identify the evaluation proponent, and identify the office to which the evaluator provides results for decision and action [Ref. 17]. This assessment plan must also integrate threat and doctrine. Additionally, It must identify individual and collective task data, including stated and implied missions. An in-depth assessment requires that it list the task, conditions, and standards for all levels of tasks. This requires that the training developer look both horizontally across different MOSs and vertically across leadership levels to compare tasks and standards to those in all other related occupational areas (including officer and enlisted specialties). Vertical task integration analysis reveals how leadership competencies mesh to accomplish a task or mission. [Ref. 13]

Training developers should lead the effort in the needs assessment. By their position, they are able to ensure that the assessment is in compliance with TRADOC guidance and policy, is technically correct, and that it applies quality control measures. Should a needs assessment confirm that a training problem or deficiency exists (which it certainly will with new materiel items as the equipment has never been used by soldiers), then the careful process of solution identification and analysis must begin. Hence, training developers should execute proactive problem identification and resolution at all times when a weapon system has been identified for development. [Ref. 13]

Evaluation actions and outputs are summarized in Table 1 which follows.

ACTION	OUTPUT
Develop general evaluation plans	<ul style="list-style-type: none"> ● Evaluation Policy ● Master evaluation plan
Conduct internal evaluation	<ul style="list-style-type: none"> ● Internal evaluation plans ● Product and process
Prepare checklists	<ul style="list-style-type: none"> ● Questionnaires ● Evaluation reports
Conduct external evaluation	<ul style="list-style-type: none"> ● External evaluation plans ● Training effectiveness analysis
Follow-up analysis	<ul style="list-style-type: none"> ● Evaluation reports
Write a tentative action plan	<ul style="list-style-type: none"> ● Trip report ● Contracted studies reports
Conduct evaluation follow-up	<ul style="list-style-type: none"> ● Post-evaluation reports
Perform needs assessment	<ul style="list-style-type: none"> ● Training deficiency identification ● Non-training deficiency identification

Table 1. SAT Evaluation Phase Actions and Outputs [Ref. 17]

2. Analysis Phase

Analysis is initiated when a needs assessment has determined that training is a partial or complete solution to correct shortcomings [Ref. 17]. The analysis phase determines which specific tasks degrade soldier, crew, system, or even unit performance. These are the tasks that require enhanced training to fix an existing or future shortfall. These could be both individual and collective tasks that require improvement. Also called "Front-End Analysis" (FEA), the analysis phases ensures that accurate description of relevant collective and individual tasks and determines what is to be trained. Task analysis is the core of the analysis phase [Ref. 18].

An FEA consist of collecting, examining and synthesizing data concerning a performance requirement prompted by any one of the following: identification of training deficiencies or performance discrepancies; change in threat or doctrine; changes in mission or organization; introduction of new or modified equipment; speciality restructures; or directed changes in training strategies. The process combines the information derived about

the task with detailed task performance specifications, such as: conditions, standards, references, safety procedures, environmental factors, task steps, skills and knowledge required, and performance measures [Ref. 18].

Training developers take the information that is produced, and then design and develop training. They also produce Army Test and Evaluation Program (ARTEP) products for collective tasks and Soldier Training Publications (STPs) for individual tasks. The individual task analysis process identifies all the actions and decision required to perform the individual task. Information from the evaluation and collective task analysis feeds the individual task analysis process. The basic task development process is the same for collective and individual tasks. [Ref. 13]

Site selection is also a part of the analysis process. It is the process of selecting the initial instructional setting for a task. Combat and training developers are involved in choosing the most effective and efficient training environment for each task. Site selection for new equipment begins early in the CBRs process. Formal recommendation of where a task should be trained is made after the task analysis process is completed (during the design and development phase). As a generalization, however, budgetary constraints are forcing more training down to the unit level, while less of it is being done in the institutional setting. Final site selection is accomplished by a site selection board which is similar in make-up to the critical task selection board [Ref. 18].

The Analysis process actions and outputs follow in Table 2:

ACTION	OUTPUT
Perform needs analysis	<ul style="list-style-type: none"> ● Triggering circumstances ● Specific training needs ● Analysis plan ● Input to long range training strategies, plans, and requirements
Perform threat, doctrine, and mission analysis	<ul style="list-style-type: none"> ● Synopsis of literature review ● Descriptions of missions and duties ● Collected data ● Total collective task inventory
Select critical collective tasks	<ul style="list-style-type: none"> ● Selection board SOP ● Critical collective task inventory ● Report on methods
Perform critical collective task analysis	<ul style="list-style-type: none"> ● Collective task performance specifications ● Supporting individual task inventory
Perform job or duty analysis	<ul style="list-style-type: none"> ● Total individual task inventory
Select critical individual tasks	<ul style="list-style-type: none"> ● Selection board SOP ● Critical individual task inventory ● Report on methods
Perform critical individual task specifications analysis	<ul style="list-style-type: none"> ● Task performance ● Supporting tasks analysis documentation

Table 2. SAT Analysis of the Evaluation Phase Actions and Outputs [Ref. 13]

3. Design Phase

Design is primarily a mental process of making decisions on “who, when, where, how, and why” the Army will accomplish its training of soldiers. The design process forms the basis for developing the training solution to a given training development shortcoming. During the design process, the Army’s training developers decide how the Army will conduct training. Using products of earlier analysis, the combat developer constructs a blueprint of the needed training programs. Training is designed using objectives for each level of professional development. Additionally, training is designed to be progressive, sequential, and integrated for skill or grade progression. [Ref. 17]

The design phase's actions and outputs follow in Table 3.

ACTION	OUTPUT
Develop objectives	<ul style="list-style-type: none">• Terminal Learning Objectives (TLOs)
Perform learning analysis recommendations	<ul style="list-style-type: none">• Enabling Learning Objectives (ELOs)• Skills and knowledge needed for mastery• Method and media, including aids and devices• Training site selection
Develop test items	<ul style="list-style-type: none">• Validated tests
Describe entry behavior	<ul style="list-style-type: none">• Target audience description
Determine sequence and structure of training	<ul style="list-style-type: none">• Training sequence• Training structure

Table 3. SAT Design Phase Actions and Outputs [Ref. 13]

4. Development Phase

The Development Phase produces collective and individual training and training materials (e.g., courses of instruction) based on the Analysis and Design phases [Ref. 17]. It ends with the production of a validated training program and validated training materials. Its actions and outputs follow in Table 4.

ACTION	OUTPUT
Review existing materials	<ul style="list-style-type: none"> ● Selected materials ● Materials identified for modification ● Rejected materials ● Final methods and media selection
Revise or develop needed materials	<ul style="list-style-type: none"> ● Draft materials ● Support requirements ● Draft program
Validate training materials and program	<ul style="list-style-type: none"> ● Validated training materials ● Validated training program ● Validated documentation
Obtain approval	<ul style="list-style-type: none"> ● Approved program ● Approved materials
Plan for staff, faculty, and cadre training	<ul style="list-style-type: none"> ● Staff, faculty, and cadre plan

Table 4. SAT Development Phase Actions and Output [Ref. 13]

5. Implementation Phase

Implementation involves the separate but related functions of preparing for and conducting training. Training is conducted individually (by each soldier) and collectively (by defined teams of soldiers). Soldiers are trained individually to competence in critical tasks, which are identified by task, condition, and standard. Crew drills are designed to capitalize on a unified effort of individual soldiers performing tactically in a small team of three to eleven members. Drills are the bridge between individual and collective training. The training development process must identify all individual and collective tasks in order to fully implement the complete training development package to ensure standardization of performance. [Ref. 17]

C. MANAGEMENT SYSTEMS IN THE SAT PROCESS

There are several management systems that influence the SAT process. All of these systems have a large impact on the success of training. It is essential that the developers of training programs understand them and become involved in the decision making cycle as

early as possible. [Ref. 17] This section will briefly discuss those systems and their influence on the SAT process.

1. The Concept Based Requirements System

The Concept Based Requirement System (CBRS) is the TRADOC process which identifies and prioritizes the Army's wartime requirements for doctrine, training, organizations, and material. This is a continuous and cyclic process. Proposed enhancements to our capabilities are prioritized in order of affordability: changes in doctrine, training & leadership development changes, organizational (TO&E) changes, and materiel changes. [Ref. 19]

2. The Life Cycle Systems Management Model

The Life Cycle Management Systems Management Model (LCSMM) outlines the life cycle of Army systems from initial concept through prototyping, testing, operational life, and finally, its phase-out and disposal. The LCSMM is used for guiding the development of material systems by combat, material, and training developers. Additionally, it provides input milestones as to when training must be available for new or associated systems. [Ref.13] The LCSMM is shown in Figure 7.

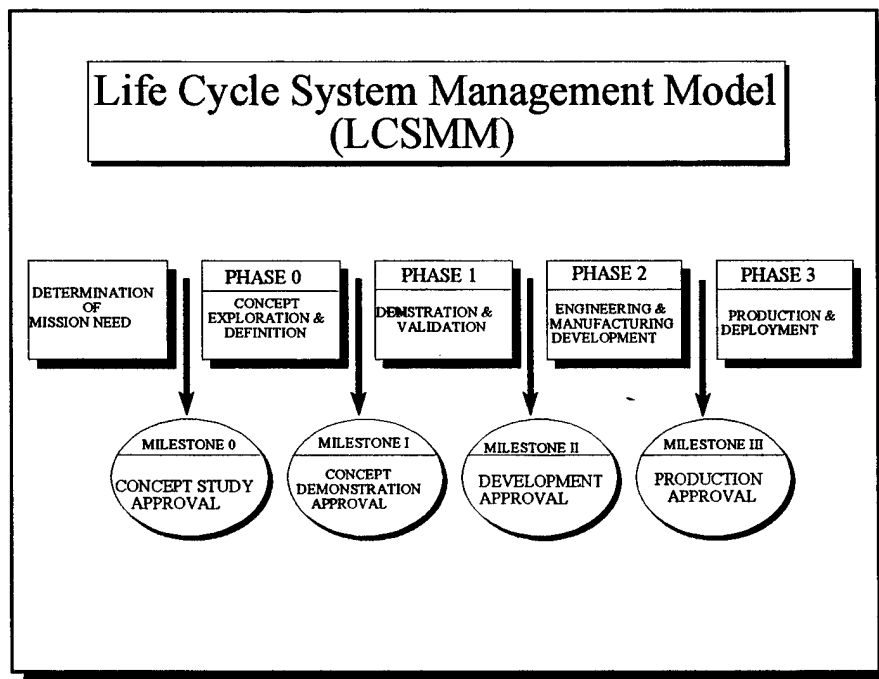


Figure 7. The Life Cycle System Management Model [Ref. 13]

3. The Manpower and Personnel Integration System

The Manpower and Personnel Integration (MANPRINT) system attempts to use human factors engineering to allow soldier-machine systems to reach maximum performance within specified constraints. [Ref. 13]

4. The Training Requirements Analysis System

The Training Requirements Analysis System (TRAS) is the management system that assures institutional training requirements are documented and forwarded to the resource acquisition system (PPBES) in time to be properly processed and utilized during the training development process [Ref. 13]. TRAS will be described in depth in this thesis.

5. The Planning, Programming, Budgeting and Execution System

Training must be resourced through the Planning, Programming, Budgeting, and Execution System (PPBES) in order to allow the training to be efficiently and effectively accomplished. Manpower, dollars, facilities, equipment, and ammunition must be planned and programmed to identify resources' requirements over a six year period. [Ref. 13]

D. CONCLUSION

Not specifically discussed, but of significant necessity, is the utilization of an audit trail during the SAT process. An audit trail must be constructed and maintained throughout the entire SAT process, through each of the SAT phases. There is no specific format or form used to maintain this audit trail. It is composed of documentation that describes each step in the process. The audit trail is essential to the revision of training because it details the rationale for decisions and actions taken. The audit trail also highlights any problems that were encountered and helps to prevent their recurrence [Ref. 17].

This chapter provided a detailed explanation of the Systems Approach to Training which serves as the means of conveyance in translating training development analysis into tangible plans, documents, and actions. SAT's interaction with a number of other management systems was also introduced, illustrating the breadth of interaction within which SAT participates.

V. THE TRAINING REQUIREMENTS ANALYSIS SYSTEM

A. INTRODUCTION

TRAS is a systematic management process which is used to facilitate the timely development, implementation, and evaluation of training, both resident and extension, by documenting the plans and supporting requirements for these actions. TRAS integrates the SAT process with resource acquisition systems which provide requires support for the training to be developed. Specifically, the purpose of TRAS is to [Ref. 7]:

- Orchestrate the SAT process;
- Identify training and resource requirements in time to inject them into resource acquisition systems (e.g., manpower, personnel, construction, ammunition, training equipment, new systems, and resource management);
- Ensure that instructors, students, facilities, ammunition, training equipment, new systems, funds, and training are available at the proper time to implement training.

In the analogy presented at the close of Chapter II, TRAS is that element of the training development process that ensures training resources are identified and provided to keep the training development process progressing without delays or shortfalls.

1. Historical Background

In 1978, TRADOC encountered severe problems in trying to implement training on a short-term basis to meet the requirements of changes made to the Army's Enlisted Career Management Fields (CMFs) and Military Occupational Specialties (MOSs). At that time, TRADOC was faced with a need to develop and implement training in a very short time to meet a number of challenging requirements. Most of these challenges included wholesale changes in CMFs, the combination of MOSs at various skill levels, and changes in MOS responsibilities for operating, maintaining and repairing current and developing equipment and weapon systems. A variety of problems resulted.

Some trainees arrived at schools before their training could commence. In other cases, new MOS training was ready to start but trainees did not show up. Some new

systems were fielded before training for them was developed and implemented. In many schools, new training development and training were conducted “out-of-hide” before the resources, equipment, products, devices, and facilities required to support them had been programmed or even identified at the school level. In addition, some of the revised MOSs had been approved without consideration of whether an efficient and economical training program was even practical. To help prevent the future occurrence of these types of problems, the TRAS process was developed. [Ref. 7]

2. Functions and Objectives

TRAS is a long-range management system that assures institutional training requirements are documented and forwarded to the resource acquisition system (PPBES) in time to inject them into the Army’s resource acquisition systems. The primary purpose of TRAS is to assure that students, instructors, facilities, ammunition, equipment, and funds are all at the right place, at the right time as required by current and future proponent CATS institutional strategies [Ref. 8]. Within TRAS, CATS determines overall strategies and the resources needed to *implement* the strategies, whereas SAT is used to *identify* changes in resources needed to more effectively conduct training within an institution [Ref. 13]. TRAS affects all occupational areas within the Army by providing an overall training strategy for each enlisted and warrant officer MOS, commissioned officer Specialty Code (SC), or separate functional training program [Ref. 15].

B. FUNDING

Although TRAS recognizes all institutional training requirements and resource needs, these requirements are not always funded. Unit (sustainment) training is funded through the annual submission of the Command Operating Budget (COB) of the individual unit's PPBES budget cycle that supports it. NET training is resourced by the respective Program Managers. [Ref. 13]

Organizations that develop or conduct training must initiate requests for the needed resources and resource support as soon as the requirements are identified.

Proper use of TRAS enables proponents to convert training strategies from concepts to reality. [Ref. 8]

C. TRAS RELATIONSHIPS

TRAS relationships will first be discussed, then graphically summarized at the conclusion of this section.

1. Materiel Development & Training Development Relationship

Both Combat Developers (CDS) and Training Developers (TDs) work with parts of the Life Cycle Systems Management Model (LCSMM) and Planning, Programming, Budgeting, and Execution System (PPBES), and the Systems Approach to Training (SAT). However, the majority of CDS' efforts are in the LCSMM and PPBES area, whereas the majority of TDs' efforts are in the SAT area. It is left up to individual Branch Schools (i.e., those schools associated with a given "branch" of the Army such as Armor, Artillery, Infantry, etc.) to implement programs and coordination procedures to affect efficient working relationships between those two groups of agencies. [Ref. 15]

The Combat Developer manages a new piece of equipment through its life cycle, from an initial concept until after it's fielded. In that process, a number of documents, completed by the CDS, briefly mention the training that will be needed when the equipment becomes a part of the soldier's job. CDS normally address training in at least four documents produced as part of the materiel acquisition process [Ref. 15]:

- Operational and Organizational Plan (O&O Plan);
- Operational Requirements Document (ORD);
- Basis of Issue Plan (BOIP);
- Qualitative and Quantitative Personnel Requirements Information (QQPRI);

Changes to training programs are generated by changes in doctrine, organization, materiel, leader development, and training as a result of the Concept-based Requirements System (CBRS) process; future CATS strategies; by the need to eliminate performance deficiencies; and/or by efforts to improve training efficiency and effectiveness. The SAT applies the evaluation, analysis, design, development, and implementation processes to

determine the “who, what, where, when, why, and how” to change training programs. The TRAS documents these changes. [Ref. 8]

The TRAS uses three types of documents-- the Individual Training Plan (ITP), Course Administrative Data (CAD), and Program of Instruction (POI). TRAS documents are requirements documents which identify the proponent’s plan and needed resources for developing and conducting individual training. Their submission results in recognition of resource requirements, *not* necessarily an *agreement* by HQ TRADOC to provide resources. Proponents must acquire resources using appropriate resource acquisition systems, and within parameters established during the TRADOC TRAS review. During this review, TRADOC will resource only those elements that it recognizes as necessary for successful implementation of the training development program. [Ref. 8]

Organizations that develop or conduct training must program and initiate requests for the needed resource support as soon as resource requirements are identified. If all related input and management systems function properly, the result is the arrival of instructors, students, ammunition, equipment, devices, training material, dollars, and facilities in time to implement the training strategy. Proper use of the TRAS enables proponents to convert training strategies from concepts to reality. [Ref. 8]

2. PPBES and Training Development Relationship

TRAS provides a linkage between numerous Army systems, particularly the SAT process and various resourcing systems. The CBRS is the primary system by which TRADOC executes its mission to be the “Architect of the Future Army.” Through the CBRS, Army needs are identified and solutions developed. The solution domains are doctrine, training leader development, organizations, and materiel. CATS is the architecture for developing the training concepts, and refining them into strategies that support identification of required training resource capabilities (i.e., ammunition, training land, ranges, facilities, training aids, resources, devices, simulators, simulations, etc.) [Ref. 8]

a. SAT

SAT provides an orderly and logical approach to training development. TRAS integrates the SAT with critical resource-related management events [Ref. 7]. Solutions to battlefield deficiencies identified by the CBRS will lead to development of tactics, techniques, and procedures (TTPs) which will be the basis for determining the tasks and skills that CATS institutional, unit and self-development strategies must train. Training developers must stay current with the CBRS and TTP development to ensure that analysis is proactive in determining possible strategies to train tasks and skills to standard. SAT is the process used to facilitate this. [Ref. 8]

As part of the SAT process, resources required to implement new or revised training programs are identified. These resource requirements are documented by proponents and validated, by HQ TRADOC, using TRAS documents, thus providing the link between SAT and the PPBES.

b. PPBES

The PPBES is a cyclic (biennial) process used to develop a plan, program, and budget for the Army. It is the Army's (as well as the other services') primary strategic management system used to allocate and manage resources. The TRAS documents the need for resources and forms the basis for initiation of resource acquisition actions [Ref. 8]. The ITP and CAD products of TRAS, which are developed by the proponent, are used as sources of information for the following PPBES events and documents [Ref. 7]:

- Military Construction, Army Command Priorities List (MCA-CPL);
- Training Ammunition Management System (TAMS);
- Structure Manning Decision Review (SMDR) which results in the subsequent publication of the Army Program for Individual Training (ARPRINT);
- Total Army Analysis (TAA);
- Program Analysis and Resource Review (PARR);
- Modernization Resource Information Submission (MRIS);
- TRADOC Review of Manpower (TRM);
- Letter Requests for Equipment;

- The Army Authorization Documents System (TAADS);
- Requisitions for Personnel and Equipment;
- Command Operating Budget (COB);
- Installation Contracts.

3. TRAS Processes

Figure 8 provides a graphical summary of the TRAS process and its relationship with other training and combat development activities.

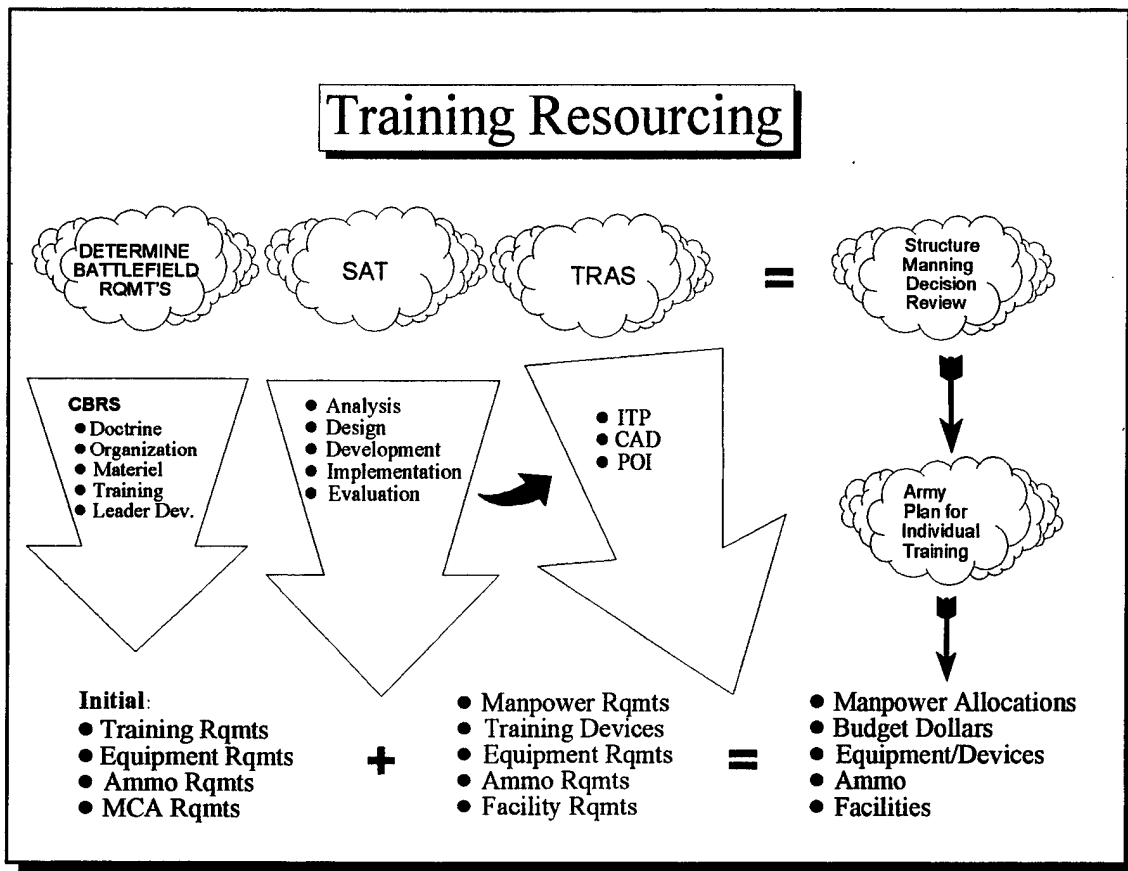


Figure 8. TRAS Process & Interaction [Ref. 8].

D. TRAS DOCUMENTATION

TRAS uses three types of documents that identify the proponent's plan and requirements for developing and conducting individual training [Ref. 8]. These three documents, the Individual Training Plan, the Course Administrative Data, and the

Program of Instruction, will be described in detail. TRAS documents contain information developed or gathered by the training proponent that enables TRADOC, schools, and other activities to plan and support the development and implementation of institutional training. [Ref. 13]

TRAS documents contain information developed or gathered by a training proponent which enables HQ TRADOC, schools, and other activities to plan and support the development and implementation of individual resident (institutional) training, to include distributed portions of resident courses. [Ref. 8]

1. The Individual Training Plan

a. Overview

Triggered by the publication of the CD documents (the O&O Plan, ORD, BOIP, QQPRI), the TD formulates an Individual Training Plan (ITP) at least five years before training begins. In accordance with current DA training development policy, this five year time frame is a minimum. In the case of a new MOS/SC, or major revision, the ITP should be completed and sent to HQ TRADOC five to seven years before the training begins (again, in accordance with current DA training development policy). TRADOC then inserts this need for training resources into the long-range PPBES. [Ref. 15]

The ITP is the key TRAS document designed to assist in managing individual training development and is approved by the training development proponent (specifically, the school commandant). The ITP serves the proponent by acting as the centralized source to coordinate the diverse activities associated with the development of training and with the programming of resources necessary to support the plan. It identifies the training and training support requirements and coordinates the training timetable with the appropriate access points of the resources systems. [Ref. 7]

The ITP is a long-range planning document which also outlines the resident and nonresident training strategy for an occupational specialty or separate training program, while ensuring that the SAT process is integrated with the sources of training needs, the PPBES, evolving training initiatives, and related resource acquisition systems. An ITP is prepared for: each enlisted MOS; each commissioned officer Area of

Concentration (AOC), branch, or functional area; each warrant officer MOS; and each separate training program that does not relate to a specific MOS, AOC, or functional area (e.g., Ranger School, Airborne School, etc.). [Ref. 8]

b. Organization

An ITP has three main sections: narrative, milestone schedule, and resource estimate. The narrative describes the sources of the individual training needs and the training strategies to satisfy those needs by course, training program, and component for peacetime and mobilization and for resident and nonresident individual training. Specifically, the narrative contains five paragraphs which address applicable references, training requirements, training strategy, training deleted, and alternatives if resources are not provided. The ITP milestone schedule provides information on the training program. A course milestone schedule is prepared for each course discussed in the ITP. The resource estimate consists of a narrative and supporting summaries outlining resources needed to support the training strategy. [Ref. 8]

c. Primary Functions

An ITP serves the following detailed functions [Ref. 8]:

- An ITP addresses all resident and distributed courses or training programs directly supporting an occupational specialty, to include contractor-conducted courses, Interservice Training Review Organization (ITRO) consolidated and collocated courses, courses which award Additional Skill Identifiers (ASI) or Skill Qualification Identifiers (SQI), and functional courses which are aligned with a Military Occupations Specialty (MOS), Branch, Area of Concentration (AOC), or Functional Area.
- Addresses at least five FYs, beginning with the current FY, to align the resource information with the PPBES budget formulation process.
- Identifies changes in doctrine, materiel, organization, leader development strategies, and/or training initiatives, such as CATS and Distributive Training Strategy (DTS), which impact on the specialty.
- Identifies distributed training products that support, or will be developed to support, the specialty.
- Identifies changes planned for the training program to include courses to be deleted, created, or revised.

- Identifies estimated dollar, ammunition, facility, and equipment/device requirements that are not currently available to the installation (e.g., not on the TDA, not included in the COB, not included in the TAMS, or new construction not approved).
- Used to develop CAD for new or revised courses.

d. Administrative Procedures

Before submitting an ITP, the proponent ensures that resource requirements identified in the ITP are coordinated at the installation level so they can be entered expeditiously into the appropriate resource acquisition systems. The ITP provides the justification for initiating these acquisition actions. The justification for submitting resource acquisition documents references the ITP in which the resource requirements were identified. Because of potentially long lead times in the resource acquisition systems, this process should be started as soon as the requirements have been approved by the proponent and coordinated with HQ TRADOC. [Ref. 8]

Approval authority for the ITP lies with its drafters. Personnel or designated functional proponents within the ITP's originating agency are called ITP proponents. Their approval of an ITP constitutes authority to continue the SAT process. The ITP must, however, be coordinated with HQ TRADOC before resource requirements will be recognized. [Ref. 8]

Personnel or designated functional proponents that prepare the ITP have the authority to approve ITPs. [Ref. 13] An exception to this policy can be found in the Combined Arms Support Command (CASCOM) and Combined Arms Command (CAC) where their respective CGs may direct their subordinate centers and schools to submit changes through them prior to submission to TRADOC. Transmittal memorandums are used to forward ITPs. [Ref. 8]

e. ITP Summary

Although the ITP is considered to be a resourcing document only, it is the only document that addresses all the formal training in an MOS/SC. It presents the training strategy for an entire MOS/SC and lists all courses for all skill levels in that MOS. It is the earliest of the three subsequent TRAS documents to be produced. No

two equipment systems, or equipment modifications, are on the exact same acquisition process, or acquisition schedule. Each program is unique unto itself; the size of the system, type of contract, and many other factors, determine the CDS' methods and schedules.

Each ITP is similarly unique. Each ITP is also a living document that can either be initiated or revised whenever the CDS or other system developers clue the TDs of a change in training needs. The ITP is divided into three major subject sections: narrative, milestone schedule, and resource estimates. Milestone dates for the development of each course and narrative of projected resource requirements are found in the ITP. Essentially, the ITP is the "early notification" of training resource needs. [Ref. 15]

2. Course Administrative Data

a. Overview

Following development of the ITP, TDs submit Course Administrative Data (CAD) for each course affected, at least 36 months prior to the start of scheduled training. The Course Administrative Data (CAD) provides essential course planning information and is the source document HQ TRADOC uses in announcing new or revised courses to input agencies. The CAD is derived from the SAT Design phase and is a relatively short document, often only one or two pages in length. It contains the course number, title, purpose, scope, prerequisites, target audience, peacetime course length, mobilization course length, training location, and training start date. [Ref. 12, 15]

Most of the information found in the CAD is developed concurrently with the course design. The CAD details for HQ TRADOC information such as personnel resources (trainer as well as trainee), facilities required for training, and equipment required for training, all as projected in the ITP. The CAD also alerts the Army personnel system to begin scheduling trainees for the subsequent course, and it serves to trigger the formal inclusion of its described course into the TRADOC course catalog. [Ref. 15]

b. Functions

The CAD provides critical planning information about a resident course which enables the recruiting, quota management, and personnel systems to take the actions needed to have students and instructors on-station in sufficient time to meet Army requirements. A CAD is prepared for each resident course and subsequently serves to establish or revise a course file in the Army Training Requirements Resource System database. A separate CAD is prepared for each separate phase of a course and accomplishes a number of functions. [Ref. 8]

As part of its revision function, the CAD facilitates solicitation of individual training requirements (student input) for new and revised courses for use during the Structure Manning Decision Review (SMDR) as well as to develop the Army Program for Individual Training (ARPRINT). As a resourcing tool, the CAD establishes estimated course data elements (optimal course size, instructor contact hours, etc.) used to determine instructor requirements during the SMDR. It also provides new or revised Initial Entry Training (IET) course descriptions and prerequisites to the U.S. Army Recruiting Command. Finally, it is used to prepare the preface pages of a POI as well as to provide course information needed to update Department of the Army Pamphlet 351-4, the Army's catalog of training courses. [Ref. 8]

c. Administrative Control

CAD proponents prepare CAD for each resident course conducted by branch schools, training centers, the Noncommissioned Officer's Academy, ROTC Cadet Command, and other TRADOC training activities, during peacetime as well as mobilization. They also prepare CAD for each course conducted at other Service locations for which TRADOC provides training developer, instructor, or other resource support. [Ref. 8]

Coordination by CAD proponents is carried out with various branch school elements, the installation staff (where the CAD proponent is based), the servicing TRADOC Management Engineering Activity (TRAMEA) field team, the ITP proponent, primary training users (other MACOM and other services), CASCOT, CAC, and other schools, centers, academies, Reserve Component Training Institutions, USAR training

divisions, installations, and MACOM which conduct the training, as appropriate, prior to submitting the CAD. [Ref. 8]

Although training development proponents have the authority to approve CAD which they develop, the CAD must be consistent with the servicing TRADOC Management Agency field team's validation. Besides being produced when new materiel items are being developed, a CAD is revised when there are significant changes projected in training strategy or course content. Minor changes do not require a CAD, but will however, be noted in the preface page of the POI. Changes made in course data or deletion of an entire course must be coordinated with the Director, Training Operations Management Activity (DTOMA). These changes must be submitted no less than twelve months prior to the requested implementation date. The minimum requirement for courses with residents from other services or foreign countries is fourteen months. [Ref. 13]

3. The Program of Instruction

a. Overview

The next action for TDs involves development and submission of the Program of Instruction (POI) for each course affected. The POI is written during the SAT Development phase. The actual planned conduct of training is in a more refined state for the publication of this document, and the TD can accurately estimate all the resources needed to successfully execute course training. The POI is a formal course record which documents the training material and content, types and hours of instruction, and total resources required to conduct training in an institutional setting (resident training) during both peacetime as well as mobilization. The POI lists critical tasks and supporting skills and knowledge taught, including distributed training phases of the course. TD proponents prepare POI for courses developed by TRADOC and conducted by service schools, training centers, NCOA, RCTI, ROTC Cadet Command, troop schools, and other training activities. Developed near the end of the training development phase, the POI summarizes and documents the conduct of a resident course.

The curriculum of the resident course is based on the tasks identified for institutional training during design, and on instructional material formulated during development.

[Ref. 7]

The POI itemizes such resources as the ammunition, equipment, training devices, and facilities needed to conduct the designed course training. The POI serves as the formal and final notification to HQ TRADOC that all resources programmed for in the ITP and CAD are now needed. The POI must be submitted to HQ TRADOC not later than six months before training begins to ensure that all resources and personnel are in place. [Ref. 15]

b. Administrative Control

Like the ITP and CAD, the POI is approved by the developing proponent (i.e. drafter). However, the proponent's approval does not obligate TRADOC to resource the program. Proponents must fully coordinate training start dates, Optimal Course Size (OCS), course lengths, Instructor Contact Hours (ICH), equipment/training devices, facility, and ammunition requirements with the Director, Training Operations Management Activity (DTOMA) [Ref. 8]. A POI must be submitted at least six months prior to implementation of a new or revised course to ensure that all resources and personnel are in place to conduct training. Temporary course changes (three iterations or six months duration) do not require submission of a revised POI [Ref. 13].

HQ TRADOC serves as the "honest broker" in the POI development process. The TRADOC Deputy Chief of Staff for Training (DCST) staffs the POI for compliance with DA and TRADOC policies and previously submitted training strategies. He and his staff also reviews the adequacy of resource requirements, and ensures that coordination with other schools and services has occurred. This coordination also includes verification of peacetime and mobilization variable course data, course length, instructor contact hours, and optimal course size for all POI. [Ref. 8]

The POI validation is accomplished by the TRAMEA field team that services the proponent school. This validation is performed for all TRADOC conducted courses and ITRO collocated (Army unique) courses conducted at other service's schools. In the event of school disagreement with TRAMEA validations, the DCST

serves as the final approval authority for instructor contact hours and optimal course size. For ITRO consolidated courses conducted at TRADOC schools, TRAMEA field teams may validate the ICH of jointly developed courses, pending ITRO approval. [Ref. 8]

The final action conducted by TDs is the submission of the revised POI after the course is validated. Course validation is accomplished by conducting the first several iterations of the course. If there is a recognized inadequacy in planned (and utilized) resources, the POI is revised, finalized, and restaffed through the school, and coordinated with HQ TRADOC. [Ref. 15]

4. Summary

The ITP, CAD, and POI are summarized graphically in Figure 9.

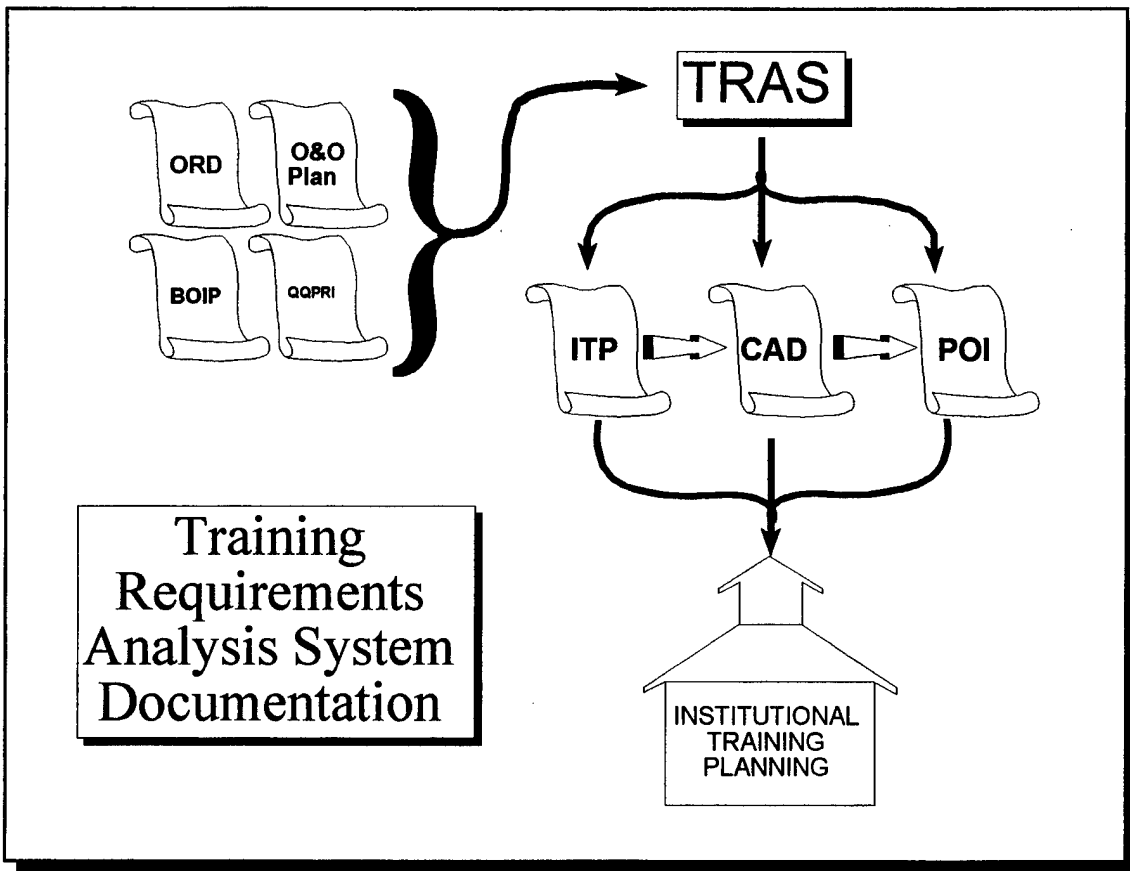


Figure 9. TRAS Documentation.

E. TIME LINES

There are two types of submissions of TRAS documents: in-cycle and out-of-cycle. In-cycle submissions are documents submitted at the appropriate times (milestones) to access the resource system to satisfy long range needs. Although new or revised training initiatives must sometimes be implemented out-of-cycle, in-cycle planning and resource management systems (including the TRAS) must be used to enable the resources to "catch-up" and satisfy long-range needs. Out-of-cycle submissions are all other submissions and are treated as unfinanced requirements that are paid for with whatever on-hand financial assets that may be available. [Ref. 8]

New facilities, courses, or classes require the TRAS system to follow a strict time line on the submission of requests. Late submissions prevent the identification of requirements and resources [Ref. 8] and postpone the implementation date of the program [Ref. 13]. When new facilities are required, the ITP is submitted at least five years before the desired occupancy date of the facility. A CAD is submitted at least three years before the implementation fiscal year (FY) of new or revised training, in order for course data to be recognized during the HQDA Structure Manning Decision Review (SMDR) and TRADOC Review of Manpower (TRM). A POI must be submitted at least six months prior to the implementation of the new or revised course. [Ref. 8]

Late submission of an ITP or CAD prevents the identification of facility requirements and the determination of instructor requirements for recognition at the appropriate year's SMDR and proper allocation of manpower during the TRM. Late submission of CAD and POI may cause late preparation and distribution of revised class schedules, late notification to soldiers of revised class dates, amendments to TDY orders, late authorization and assignment of instructors and training developers, and insufficient time to incorporate HQ TRADOC and major subordinate command guidance prior to implementing a new or revised course. [Ref. 8]

F. CONCLUSION

While TRADOC has not claimed TRAS to be a cure for the multitude of problems inherent in the planning and programming of training, it does provide a

significant capability for precluding or alleviating many of the more severe problems that can arise. TRAS provides a framework for bringing together all of the elements of an installation and training program that have a significant role in planning and programming training early on to meet requirements of developing systems; and it provides a method for estimating and communicating the specific short and long-term resource requirements for developing and conducting individual training. [Ref. 7]

VI. THE SYSTEM TRAINING PLAN

A. INTRODUCTION

1. Overview

This chapter covers the development and contents of the System Training Plan (STRAP) produced by CATS agencies in support of new materiel items. Policy governing its development, and timelines reflecting its submission requirements are also discussed. In the analogy provided at the close of Chapter II, the STRAP is the road-map produced and followed by CATS agencies in reaching the final training development product.

2. Functions

The STRAP is the master training plan for new/improved systems and performs a variety of functions. The STRAP defines the requirements for managing the development and integration of training for new or improved materiel (hardware or software) systems the Army plans to buy. The STRAP applies to all materiel systems bought for the Active and Reserve Components (AC/RC) under the standard acquisition strategy including that equipment developed under Preplanned Product Improvement (P3I), and Materiel Change Management (MCM) programs. It also fulfills the training planning requirements a number of Army regulations. [Ref. 11]

The training developer at the system proponent school prepares a STRAP for each developmental and nondevelopmental materiel system, including nonsystem training devices. The STRAP is the TRADOC proponent school's master training plan for the materiel system and provides the following functions [Ref. 16, 11]:

- Documents the results of early training analyses covering specifically who requires training, what tasks need training, and when, where and how proponents will conduct training.
- Starts the planning process for all necessary courses and course revisions, training products, and training support required in a proponent school and supporting schools.

- Establishes milestones to ensure timely development of training and training products, and training support to permit testing and fielding of the total system.
- Communicates training requirements within and between TRADOC schools and centers, HQ TRADOC, materiel developers, users, MACOMs and HQ DA.
- Establishes the basis for assessing training progress in support of the Requirement Review Committee (RRC) actions, integrated logistical support (ILS) reviews, training test support package (TTSP), TRADOC Materiel Evaluation Committee (TMEC) reviews, in-process reviews (IPRs) and Milestone Decision Reviews (MDRs).

B. POLICY

For every developmental/nondevelopmental materiel system (including software, materiel changes, and nonsystem training devices), the “system proponent school” prepares and submits for approval an initial STRAP. The system proponent school differs from the system training proponent school in that the former serves as the proponent for the materiel item, and the latter for the training development of that equipment. When the system proponent school and the system training proponent school are not the same schools, then the system training proponent school is responsible for preparing the STRAP. [Ref. 16]

In order for a system to progress, an approved STRAP is required prior to MDRs I, II, and III. Although the requirement can be waived by Headquarters, TRADOC (HQ TRADOC), failure to have an approved STRAP for these MDRs will result in an unfavorable recommendation for the system at the TRADOC Materiel Evaluation Committee (TMEC) and other decision review bodies. [Ref. 16]

The STRAP is a “living document” required to be updated (and approved) prior to Milestone II and III. However, this requirement may be waived for systems that require little or no additional training or training support. A system that undergoes a hardware change resulting from a MCM Program (including software updates), may require an updated STRAP if the change has significant impact on training support. Using the Systems Approach to Training (SAT) process, Military Occupation Skill (MOS) proponents determine whether an updated STRAP is required. A system designated for

an approved change in operational concept may require an updated STRAP if the change has significant impact on training support. Using the SAT concept, the MOS proponent determine whether an updated STRAP is required. All updates to a STRAP are submitted to HQ TRADOC for approval. [Ref. 16]

C. STRAP SUBMISSION

1. Overview

TRADOC proponent schools develop the initial STRAP during Phase 0 (Concept Exploration and Definition) and submit it to Headquarters, TRADOC, for approval 90 days prior to Milestone I. No later than 90 days prior to MDR II and III, proponent schools submit the updated or revised STRAP for approval to support the respective milestones. As part of the submission of the updated or revised STRAP prior to MDR III, proponents assess the status of the Institutional Training System, Unit/Sustainment Training (for both individual and collective training), Resource Summary (which outlines the trainee personnel requirements, instructor requirements, and "hardware" requirements needed for training), and the System Milestone Schedule. [Ref. 16]

Each of those four areas are then evaluated as Red (not ready and will result in a delay in fielding the training subsystem concurrently with the system), Amber (not ready but will be on schedule prior to the fielding of the system), or Green (on schedule and will support the system at fielding). For areas evaluated as Red, the proponents are required to provide a get-well date and describe what is being done to fix the products or training. A Red area may result in recommendation to delay the system until the training deficiencies are green.

2. Staffing & Coordination of STRAP

Proponent schools request initial input to the STRAP from supporting schools and MSC upon notification of MNS (Mission Needs Statement) approval. Proponent schools then provide a copy of the draft STRAP and approved MNS to each supporting school and MSC to serve as the basis for their input. Upon receipt of supporting school and MSC input, the proponent assembles the initial STRAP and staffs it to the following (as applicable): the system Program Executive Officer (PEO); Program Manager (PM); the

special task force, study group, or acquisition team if needed; and the Simulation Training and Instrumentation Command for review and comment. [Ref. 16]

After receipt of input and comments, the proponent school finalizes the initial STRAP and submits it directly to HQ TRADOC without further coordination. HQ TRADOC in turn provides comments, approves, or disapproves the entire STRAP or portions of it. Upon approval from HQ TRADOC, the proponent schools then publish and distribute the initial STRAP to Headquarters, Department of the Army (HQDA), all other affected schools, the MSCs, user's MACOM, those agencies that provided staff approval or comments, and Army Materiel Command (AMC) organizations to include STRICOM. [Ref. 16] The STRAP staffing, coordination, and approval process is illustrated in Figure 10.

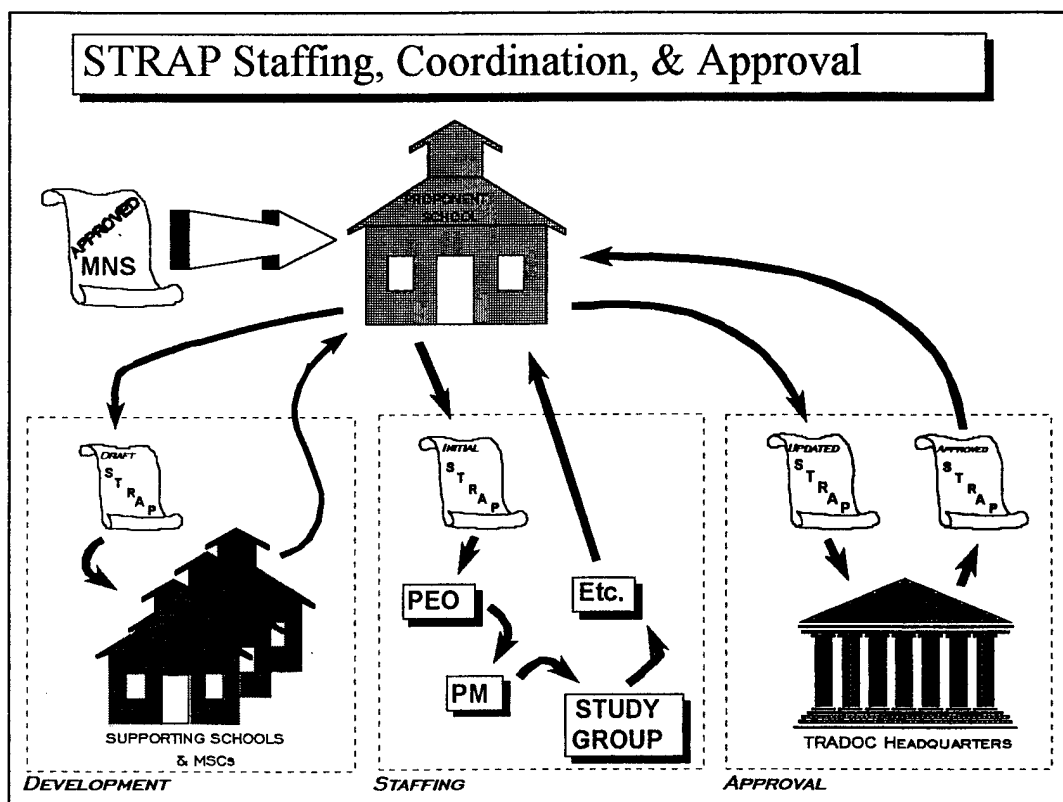


Figure 10. Staffing & Coordination of STRAP

3. Timelines

Approximately nine months before MDR II, proponent schools request additional supporting school, MSC, and STRICOM input. When the STRAP is complete, it is staffed to affected schools, MSCs, user's MACOM, PEO/PM, and AMC organizations. The final version of this STRAP is then sent to HQ TRADOC again for approval, and once approved is sent back to all agencies by which the STRAP had been staffed. The same iterative process takes place approximately nine months before MDR III. Unless a major revision is required, the proponent may submit updates by memorandum or change pages. [Ref. 16]

D. STRAP DEVELOPMENT

As stated earlier, the STRAP is a living document to which information is added and updated as the materiel system development progresses. As a living document, its completeness is dependent to a large degree on development of the materiel system. Throughout this process, the Directorate of Evaluation and Standardization (evaluation) is essential for ensuring a quality training product is developed. The STRAP remains active until all training strategies or actions are implemented. The Deputy Chief of Staff for Training (DCST), HQ TRADOC, approves the STRAP. [Ref. 11]

Managing the STRAP involves application of six general activities by training developers. These six activities are listed below and described further in greater detail for those steps requiring a detailed description [Ref. 11]:

- Evaluation of STRAP training strategy effectiveness;
- Formulate STRAP and ensure completeness;
- Update and resubmission of STRAP (repeated for each Milestone);
- Completion of training status assessment for Milestone III;
- Transfer pertinent information in STRAP to other training development documents;
- Establishment of an audit trail.

1. Step 1 -- Evaluation of STRAP Training Strategy

Ensuring that the STRAP training strategy is effective involves evaluation of a number of basic elements used in developing the training strategy for a materiel system. Evaluation of these elements often involves “capturing” the essential information in a narrative description. This description provides documentation of the analyses involved in developing the training. Describing how the new system will impact on the Combined Arms Training Strategy (CATS), current or future, when it is fielded is one of the first of these elements. The individual training strategy, including CATS, for a new system provides a detailed description of how the enlisted and warrant officer MOS/SSI/SQI and commissioned officer AOC/FA/SI proponents intend to train for the system. The individual training description includes consideration of the following [Ref. 11]:

- Basic and advanced individual training;
- Basic Noncommissioned Officer Courses (BNCOC);
- Advanced Noncommissioned Officer Courses (ANCOC);
- Officer Basic Course (OBC);
- Other service school functional courses.

Training strategy considerations include the possibility of elimination or minimization of the impacts of training on the environment, use of stand-alone training devices, utilization of embedded training capabilities, and applicability of simulations and simulators. If extension training is a viable alternative, then proponents take into consideration training via officer and NCO courses as a means to provide the subject matter expertise for home units, and they consider high quality sustainment extension training to ensure effective operation of the system in the field without the need for institutional training [Ref. 11].

All training strategy development must support training of the system from cradle to grave [Ref. 11].

2. Step 2 & 3 -- Formulate STRAP and Ensure Completeness, and Submit Updates as Required.

These steps are somewhat self-descriptive. The training developer writes the STRAP, checks it for format and content, and submits it as required. The content of the STRAP will be discussed in section E of this chapter.

3. Step 4 -- Training Status Assessment (for Milestone III).

A cover letter is submitted with the STRAP for Milestone III to assess the status of institutional training, unit and sustainment training, resources, and the system milestone schedule. A Red, Amber, Green color coding system is used to evaluate each of the aforementioned areas. Red indicates an area is not ready and will result in a delay in fielding of the training subsystem concurrently with the system. Amber indicates that an area is not ready but will be on schedule prior to fielding the system. Green indicates that the given area is on schedule and will support the system at fielding. For any system rated Red, the proponent is required to provide a get-well date and describe proposed fixes to the products or training problems. A Red rating may also result in a recommendation to delay the system until the training deficiencies are rated Green. [Ref. 11]

4. Step 5 -- Dissemination to Other Documents.

What follows is the minimum listing of documents into which the STRAP feeds. Other documents are also provided information from the STRAP, but these are exceptions out of the norm and not addressed here. It is the training developer's responsibility to ensure that pertinent information in the STRAP is disseminated to the following [Ref. 11]:

- Training Requirements Analysis System:
 - Individual Training Plan (ITP);
 - Course Administrative Data (CAD);
 - Program of Instruction (POI);
 - Soldier Training Publications (STPs);
- Training device development;

- Army Modernization Training Automation System (ATMAS), the new database for New Equipment Training Plans (NETP);
- Training Test Support Package (TTSP);
- Operational Requirements Document (ORD);
- Facilities:
 - Ranges;
 - Real property,
- Training Effectiveness Analyses (TEA);
- Doctrine and Tactics Training (DTT);
- Basis of Issue Plan (BOIP);
- Qualitative and quantitative personnel requirements information (QQPRI);
- Resourcing:
 - Civilian, officer, and enlisted manpower;
 - Civilian pay;
 - Travel / per diem;
 - Contractor support;
 - Training ammunition;
 - Printing.

5. Step 6 -- Audit Trail Establishment.

While the STRAP itself provides an audit trail of actions over the life cycle of the system development, other documentation is essential to provide rationale for decision.

Therefore, the audit trail should include the following:

- Copies of the STRAP and all related updates;
- All internal staffing comments;
- Copies of all source information used in preparation of the STRAP;
- Correspondence received from external staffing with supporting schools and Major Army Commands (MACOMs);
- Approval correspondence with associated comments.

E. STRAP CONTENTS

1. Initial Strap

Each proponent school, supporting school, and MSC (when designated as a proponent) conducts a needs analysis and assessment to determine if a system requires any training to support operators, maintainers, supervisors, and/or commanders. Facets of input they consider include requirements for institutional training, unit sustainment training, and New Equipment Training (NET, to include IKPT and DTT). The results of these analyses are then summarized and documented in the initial STRAP. At a minimum, the initial STRAP contains the following [Ref. 16]:

- System Description;
- Assumptions;
- Training Concept (to include embedded training considerations);
- Training Constraints;
- Training Device Strategy;
- Summary of Significant Issues at Risk.

As updates and revisions are performed for MDRs II and III, this initial STRAP is so changed. It should also include the results from analyses conducted to determine training requirements for operators, maintainers, supervisors, commanders, institutions, units, and NET [Ref. 11].

The precise contents, processes, and actions of the STRAP by paragraph and subject will be discussed in the following sections. Each section is titled by the subject and paragraph number of that portion of the STRAP. The process that is conducted supporting that portion of the STRAP is named, and the actions supporting that process are listed.

2. System Description (Paragraph 1)

Process: Develop System Description

Actions:

- Gather all available materiel hardware or software, system training devices, and operational data.

- Prepare description to identify:
 - What the system looks like;
 - Who will employ it;
 - How units will use it;
 - If the system replaces another system;
 - If the system is multipurpose.
- Obtain First Unit Equipped (FUE) date.

3. Assumptions (Paragraph 2)

Process: Develop Assumptions

Action: Provide a list of assumptions which support the validity of the training concept.

4. Training Concept (Paragraph 3)

Process: Develop training concept.

Action:

- Gather general information providing philosophy and rationale for proposed training concept.
- Ensure philosophy reflects Army's Long Range Training Plan, proponent branch's long-range training plan, and proponent's CATS.
- Explore training devices/embedded training.
- Review AC/RC considerations.
- Describe impact on CATS (current and future) when fielded.

5. Training and Environmental Constraints (Paragraph 4)

Process: Prepare training constraint narrative.

Actions:

- Obtain System MANPRINT Management Plan (SMMP) training constraint information.
- Ensure environmental risk assessment completion and eliminate or minimize training impact on the environment.

6. New Equipment Training Strategy Summary (Paragraph 5)

Process: Prepare new equipment training strategy.

Actions:

- Identify transfer of initial knowledge of the new system from materiel developer to the trainer and the receiving units.
- Provide feeder information to section V of the NETP.
- Review the training strategy development elements (described above).

7. Training Device Strategy (Paragraph 6)

Process: Develop training device strategy.

Actions:

- Identify potential training devices to support institutional training.
- Identify potential training devices to support unit training.
- Explain how training devices will be used.
- Identify ET and required characteristics. Within this context, ET is defined as training that is provided by capabilities designed to be built into or added into operational systems to enhance and maintain the skill proficiency necessary to operate and maintain the equipment end item. It is not allowed to adversely impact operational requirements or capabilities of the equipment but may be used to train individual tasks through force-level collective tasks.
- Explain how training devices and ET will assist in reaching the CATS training proficiency gate in institutional and unit training.
- Identify the need for instructor and operator training on training devices and ET.
- Prepare narrative training device strategy based on training analyses and input from STRICOM.

8. Training Test Support Strategy (Paragraph 7)

Process: Develop the Training Test Support Package (TTSP)

Actions:

- Determine when the test agency needs the TTSP;
- Prepare strategy for:

- Training and certifying test players and maintainers;
 - Implementing the TTSP;
- Develop:
 - Training data requirements;
 - Training certification plan;
 - Training schedule;
 - Program of Instruction (POI) for each affected job;
 - Lessons;
 - Mission Training Plan (MTP) or change;
 - Drills or changes;
 - Soldier Training Publications (STP) or changes;
- Identify ammunition, targets, and ranges required for training.

9. Significant Training Issues at Risk (Paragraph 8)

Process: Develop significant training issues at risk;

Actions:

- Identify vital training issues;
- Develop recommendations to solve issues;
- Develop recommendation to delay major decision;
- Prepare narrative of significant training issues at risk.

10. Post Fielding Evaluation Summary (Paragraph 9)

Process: Develop post-fielding evaluation summary.

Actions:

- Identify:
 - Who will be evaluated;
 - What will be evaluated;
 - Who will conduct the evaluation;
- Determine:
 - How and when the evaluation will be conducted;
 - How the evaluation data will be analyzed;
 - How the evaluation data will be staffed;

- Prepare narrative post fielding evaluation summary.

11. Institutional Training System (Annex A).

Process: Develop institutional training system annex.

Actions:

- Establish milestones for completion of school actions and products;
- Obtain supporting schools' separate STRAP annexes;
- Update soldier training strategy;
- Produce institutional training system annex.

12. Unit and Sustainment Training (Annex B).

Process: Develop unit and sustainment training annex.

Actions:

- Document individual training requirements for operators, supervisors, and maintainers; and describe the recommended training event frequency to maintain soldier performance to standard.
- Document collective training requirements for crews and units to employ the system using the correct doctrine and tactics.

13. Resource Summary (Annex C).

Process: Develop resource summary annex.

Actions:

- Identify NET trainer personnel requirements for execution year and five years out by officer, warrant officer, and enlisted soldier;
- Identify instructor requirements for new equipment testing for the execution year and five years out by officer, warrant officer and enlisted soldier;
- Show the number of systems and pieces of systems required for the training base;
- Show BOIP numbers for the systems;
- Prepare resource summary, organizing by proponent and supporting school requirements.

14. System Milestone Schedule (Annex D).

Process: Develop milestone schedule.

Actions: Schedule actions, analyses, products, programs, etc.

15. Coordination Summary (Annex E).

Process: Develop coordination summary.

Actions: Obtain comments from other agencies and commands internal and external to TRADOC indicating whether comments were submitted or whether submitted comments were accepted.

F. CONCLUSION

The STRAP is the central document for training development for new materiel items. Its content, organization, and submission process are consistent for all programs. The STRAP is the master training plan for the training development efforts of CATS agencies using the SAT and TRAS processes. This chapter provided a detailed breakdown of the various sections, process, and actions required to complete the STRAP.

VII. TRAINING AND COMBAT DEVELOPMENT INTERACTION

A. INTRODUCTION

This chapter illustrates the interaction of training development through various combat and materiel development documents and processes. The chapter is organized into three main sections: input provided to combat development documents, training development tasks required to be performed for each phase in the Life-cycle System Management Model, and training analysis summary of actions performed for an example system. The chapter concludes with a graphical summary of the total training development interactivity with materiel development and the PPBES.

B. INTERACTION OVERVIEW

Materiel acquisition is a complicated and lengthy process, and it requires close coordination between the combat developer and the training developer to develop and field a complete system. Management of the various procedures, from identification of a deficiency to the fielding of a system, is complex. To cope with this complexity, the Army introduced the Concept-based Requirements System (CBRS) and the Life Cycle System Management Model (LCSMM). these models provided appropriate milestones to enhance coordination of the materiel development, combat development, training development, personnel requirements, and logistic support actions. [Ref. 16]

Training impacts and costs are critical to system performance. Both must receive priority consideration before actual initiation of a system acquisition. The System MANPRINT Management Plan (SMMP) captures requirements for early coordination of combat development and training development, and it causes the combat developer and the training developer to interact in the Concept Exploration and Definition phase of system development. This interactions must prevail throughout the life cycle of the system. The training developer must continuously coordinate with the TRADOC Systems Manager/Combat Developer (TSM/CD) to obtain current information on the materiel system. [Ref. 16]

C. INPUT TO COMBAT DEVELOPMENT SUPPORTING NEW EQUIPMENT DEVELOPMENT AND FIELDING

The Systems Approach to Training (SAT) processes are applied in developing inputs to combat development documents. The timing and specificity of training development input depends on the progress of the new equipment evolution from an identified need through development to production and deployment. The training manager must ensure that training development for new equipment is totally integrated with the management of the new equipment development. This is accomplished by following a five stage Life-Cycle System Management Model (LCSMM). The LCSMM is a process that is delineated by activities/phases and milestones. Specific work is accomplished by requirements generation and acquisition management personnel during activities/phases. Decision points in the process are at the milestones. [Ref. 11]

A new equipment system can take from three to thirteen years to progress from concept study approval to deployment. For training development managers to effectively manage the development of new equipment training in accordance with SAT over the three to thirteen year period, they must accomplish a number of key tasks. First, they must establish an effective quality control program along with an audit trail to ensure the development of quality products and an ability to reconstruct the rationale for decisions made during development. They must also maintain a constant status as to where equipment development stands in relation to the LCSMM milestones, know what corresponding training products have already been developed, scheduled, or budgeted for, and conversely, know for which program those functions have yet to be accomplished. [Ref. 11]

Given that program and training status maintenance are in place and operating effectively, training developers must then match specific training-related equipment products to SAT phases. Then using the appropriate SAT phase guidelines and regulations, they evaluate those products they've developed. Throughout the SAT phases, a continuous review process is conducted with training input to combat development documents, TRADOC required training plans, and documentation that

supports new equipment fielding, institutional training, and sustainment training. This ensures that effective and suitable means of training units and leaders in the use of a new equipment system have been successfully developed. [Ref. 11]

Finally, training development managers must ensure that embedded training (ET) is a consideration for individual/operators, crew, functional, and force-level capabilities. ET is training built into or added into operational systems to enhance and maintain the skill proficiency necessary to operate and maintain that equipment end item. [Ref. 11]

D. TRAINING INPUT TO COMBAT DEVELOPMENT DOCUMENTS

Training developers interact with combat developers through a variety of documents throughout the developmental life of a program. These interactions are summarized in the following subsections that discuss the information exchange by event and document.

1. Mission Need Statement (MNS)

All acquisition programs are based on identified mission needs. Continuing assessments of current and projected capabilities, in the context of changing military threats and national defense policy, directly generate these needs. The Army first evaluates mission needs to determine if nonmateriel solutions can satisfy them. The Enhanced Concept Based Requirements System (ECBRS) fulfills this purpose. Training developers contribute to paragraph 5 of the MNS (which includes training constraints). Training constraints that training developers consider include the following [Ref. 11]:

- MOS overload;
- Training time;
- Resources (POL, ammunition, equipment, instructors, funds, etc.)
- Training burdens (school and unit)
- Facilities;
- Ranges and training areas;
- Embedded training or training devices;
- Manpower/force structure effectiveness on training capabilities;
- Limitations due to environmental laws and regulations.

2. System MANPRINT Management Plan (SMMP)

The training developer participates in the MANPRINT Joint Working Group (MJWG) to ensure training constraints and issues are addressed. Participation continues

throughout the acquisition process. Besides the constraints shown in the MNS above, the SMMP should consider the following issues [Ref. 11]:

- Soldier learning capacity;
- Degradation of knowledge and skills;
- Training design;
- Soldier aptitude;
- Target audience description;
- Reading level;
- Cognitive, physical or psychomotor characteristics or limitations that affect training;
- Training costs and affordability.

3. Operational Requirements Document (ORD)

The ORD is a formatted statement containing performance and related operational parameters for the proposed system. The initial ORD describes minimum acceptable requirements (thresholds) needed to satisfy the MNS. The training developer ensures that the ORD clearly states training requirements and constraints. Trainer input considers the following [Ref. 11]:

- Capabilities Required (ORD Paragraph 4.): states the need for embedded training (ET) as appropriate.
- Human Systems Integration (ORD Paragraph 5.c.):
 - Describes operational and maintenance training concepts (training devices, ET, and interactive courseware).
 - States objectives and thresholds for training.
 - Identifies training methodologies to be used.
- Computer Resources (ORD Paragraph 5.d.): identifies any unique user interface requirements, documentation needs, and special software certifications.
- Force Structure (ORD Paragraph 7.): ensures estimated number of systems and subsystems include items for training.

Additionally, training developers ensure that all ET and training devices are included in the ORD (whether in the body or annexes). They also ensure there exists strong supporting rationale for having them. [Ref. 11]

4. Cost and Operational Effectiveness Analysis (COEA)

Training developers ensure that a Training Effectiveness Analysis (TEA) is funded and accomplished in a timely manner to support the COEA. The TEA identifies training initiatives (design, technologies, etc.) which contributed to cost and training effectiveness of the materiel system. [Ref. 11]

5. Basis of Issue Plan (BOIP)

Training developers prepare the BOIP training impact statement. They also review the document and ensure inclusion of the total quantity of systems and/or components (including training devices) required for the training base. A system may have several BOIP which correspond to each line number or major component. Each device also has a BOIP. Preparation of the BOIP is considered to be critical to the institution providing initial individual training. Components are identified in the "Notes" section of the BOIP. [Ref. 11]

6. Qualitative and Quantitative Personnel Requirements Information (QQPRI)

Prepared by the training developer, it reviews the adequacy of support and consistency with the training concept, training strategy, career management field objectives, and force structure objectives. [Ref. 11]

7. Individual and Key Personnel Training (IKPT)

The materiel developer funds IKPT for new systems; however, the institution must pay the travel costs. The materiel contractor provides this training. The institution training developer or instructor may attend for the following reasons [Ref. 11]:

- To obtain essential information necessary for development of courseware for the institution.
- To receive training necessary to be a participant in initial or follow-on operational test and evaluation.

- To receive training necessary to be a member of the new equipment training team when the institution is required to provide such support.

8. Operational Test Readiness Statement

The institution trainer (usually a general officer) certifies the following [Ref. 11]:

- Test players can perform individual and collective tasks and know how to properly employ the system;
- Training validation;
- Representative test players are being used;
- Training materials used are those that will be used in the school and units.

9. New Equipment Training Plan (NETP)

Training developers participate in several ways using the Army Modernization Training Automation System (AMTAS) [Ref. 11]:

- Use of AMTAS to review the materiel developer's NETP and provide comments and recommended changes to the plan through the Systems Training Integration Division, Training Development and Analysis Directorate, HQ TRADOC.
- Use of AMTAS to confirm size of personnel commitment when the institution has agreed to provide instructors for new equipment training.
- Use of AMTAS to obtain schedule for new equipment fielding that the school will support with Doctrine and Tactics Training (DTT), a school responsibility.

10. Major Construction, Army (MCA) Facilities

Through a review of all combat development documents, training developers determine requirements for MCA facilities. This is a task that must be done at least five years in advance of the year required for occupancy to ensure that these facilities are included in the installation engineer's program. [Ref. 11]

11. Technical Manuals (TMs)

Technical manuals are used by all soldiers at all levels for various maintenance, operation, and repair tasks. Training developers ensure the adequacy of TMs by [Ref. 11]:

- Providing early input to the TM developer;
- Attending in-process reviews of the draft TM;
- Participating in and supporting TM assessment by:
 - coordinating the content verification plan;
 - providing the following support for verification:
 - facilities / tools;
 - soldiers for tests;
 - observers / supervisors.

E. TRAINING DEVELOPMENT ANALYSES BY LCSMM PHASE

1. Introduction

The U.S. Army 12 uses a consistent training development process for materiel items for which they provide training input. The detailed training development inputs subsequently discussed were derived from the Command and Control Vehicle (C2V) program. The process as documented is not particular to this individual weapon system, but is typical for the majority of programs for which the 12 is the training development proponent.

The subsections are organized as follows. Each subsection is titled with the name of the LCSMM phase it documents with the overall activity required to be conducted by the training developer. Within each subsection, the relevant documents and events requiring input from training developers are annotated with the sequential analysis process in bullets beneath that document title. The analysis process by LCSMM phase follows.

2. Determination of Mission Need

a. ECBRS

Action: Develop training solutions to identified deficiencies.

Process:

- Receive and review deficiencies;
- Formulate training solutions;
- Staff proposed solutions;
- Prepare final response for signature;
- Forward response.

b. MNS (Mission Needs Statement)

Action: Provide input for paragraph 5 (training constraints).

Process:

- Receive and review Mission Needs Statement;
- Formulate training input;
- Staff proposed training input;
- Prepare final response for signature;
- Forward training solutions.

3. Milestone 0 - Concept Exploration and Definition

a. ORD (Operational Requirements Document)

Action: Provide training input to Paragraph 5 of ORD.

Process:

- Receive and review mission needs statement;
- Prepare and forward staffing memorandum;
- Receive staffing input / feedback;
- Prepare final training input for signature;
- Forward training solutions.

b. SMMP

Action: Provide input to training domain.

Process:

- Receive and review draft SMMP;
- Prepare and forward staffing memorandum;
- Receive staffing input / feedback;
- Prepare final training domain input for signature;
- Forward training solutions.

c. ILSP

Action: Provide input to training and training support element.

Process:

- Receive and review draft ILSP;
- Prepare and forward staffing memorandum;
- Receive staffing input / feedback;
- Prepare final training and training support input for signature;
- Forward training input.

d. TEMP (Test and Evaluation Master Plan)

Action: Develop DTT strategy.

Process:

- Receive and review draft TMP;
- Prepare and forward staffing memorandum;
- Receive staffing input / feedback;
- Prepare final TEMP input for signature;
- Forward training input to TEMP.

e. RFP/SOW (Request for Proposal / Statement of Work)

Action: Review and provide input to system training requirements.

Process:

- Receive and review RFP/SOW;

- Prepare proposed input to system training requirements;
- Staff proposed input;
- Receive and incorporate staffing input / feedback;
- Prepare final RFP/SOW input for signature;
- Forward input to RFP / SOW.

f. STRAP (System Training Plan)

Action: Prepare initial STRAP 90 days prior to Milestone I.

Process:

- Review ORD and available documentation on new system;
- Initiate planning;
- Formulate initial STRAP (paragraphs 1-4, 6, 8);
- Staff initial STRAP;
- Receive and incorporate staffing input / feedback;
- Prepare STRAP cover letter for signature;
- Distribute / mail-out initial STRAP.

4. Milestone 1 - Demonstration and Validation

a. STRAP

Action: Develop / refine STRAP 90 days prior to MDR II.

Process:

- Assemble / review initial draft feedback;
- Review latest system information;
- Integrate appropriate updates (complete all paragraphs);
- Staff updated STRAP;
- Receive and incorporate staffing input / feedback;
- Prepare STRAP cover letter for signature;
- Submit updated STRAP for TRADOC approval.

b. CATS (Combined Arms Training Strategy)

Action: Integrate system into strategy.

Process:

- Provide systems information / STRAP for CATS integration;
- Provide input to CATS integration.

c. RFP/SOW

Action: Provide review and input to system training requirements.

Process:

- Receive and review RFP/SOW;
- Prepare proposed input to system training requirements;
- Staff proposed input;
- Receive and incorporate staffing input / feedback;
- Prepare final RFP/SOW input for signature;
- Forward input to RFP/SOW.

d. ITP

Action: Develop or update as required;

Process:

- Provide STRAP for ITP development / update;
- Provide input to ITP update.

e. MFP/BOIP

Action: Identify equipment requirements to support training.

Process:

- Review draft MFP/BOIP;
- Prepare staffing memorandum to integrate training requirements;
- Integrate staffing feedback / input;
- Prepare training input to MFP/BOIP for signature;
- Forward MFP/BOIP input.

f. QQPRI

Action: Document soldier skills, knowledge, ability.

Process:

- Receive and review QQPRI;
- Identify training requirements.

g. NETP

Action: Provide training strategy input.

Process:

- Participate in Consolidated Training Support Working Group.
- Identify TADSS requirements.

h. IPR Action/Process: Provide status update and participate.

5. Milestone II - Engineering & Manufacturing Development

The following documents and events are described as processes that are conducted (i.e., the "action" supported by the process is not specifically named). Each action supported by the named process or processes can generically be described as "provide information and support to [the named document or event]."

a. TM Review/Verification: Obtain Subject Matter Expert technical review and input.

b. LSA/LSAR: Obtain Subject Matter Expert technical review and input.

c. IPR: Provide status update and participate.

d. CAD: Provide detailed training resource requirements.

e. TTSP:

- Update STRAP no later than 90 day prior to Milestone III;
- Develop training data collection requirements;
- Develop training certification plan;
- Develop draft DTTP;
- Receive and review contractor training materials;
- Conduct front-end analysis;

- Develop critical task list;
- Develop draft soldier's manual tasks;
- Develop draft ARTEP MTP tasks;
- Assemble TTSP (the initial TTSP is due 16-18 months prior to the test event, and the final TTSP is due 60 day prior to the test).

f. EUT&E:

- Provide TTSP for test player training;
- Provide training evaluator;
- Develop OTRS.

g. IOT&E:

- Provide TTSP for test player training;
- Provide training evaluator;
- Develop OTRS.

h. RFP/SOW: provide review and input to system training requirements.

6. Milestone III - Production and Deployment

This section describes the processes and actions in the same manner as those of the preceding section.

a. I&KPT: Provide personnel for training.

b. IPR: Provide status update and participate.

F. CONCLUSION

This chapter discussed the interaction of training development through various combat and materiel development documents and events. The chapter examined how training development inputs are provided by phase of the LCSMM, by document throughout the developmental life of the materiel item, and by event during the developmental life of the materiel item. Training development permeates every phase, every key document, and every milestone event throughout the life of a program. This chapter has demonstrated that the training development process is not a "fire and forget" activity, but is one that requires constant input and updating by its designers.

Systems Integration for New Materiel Development

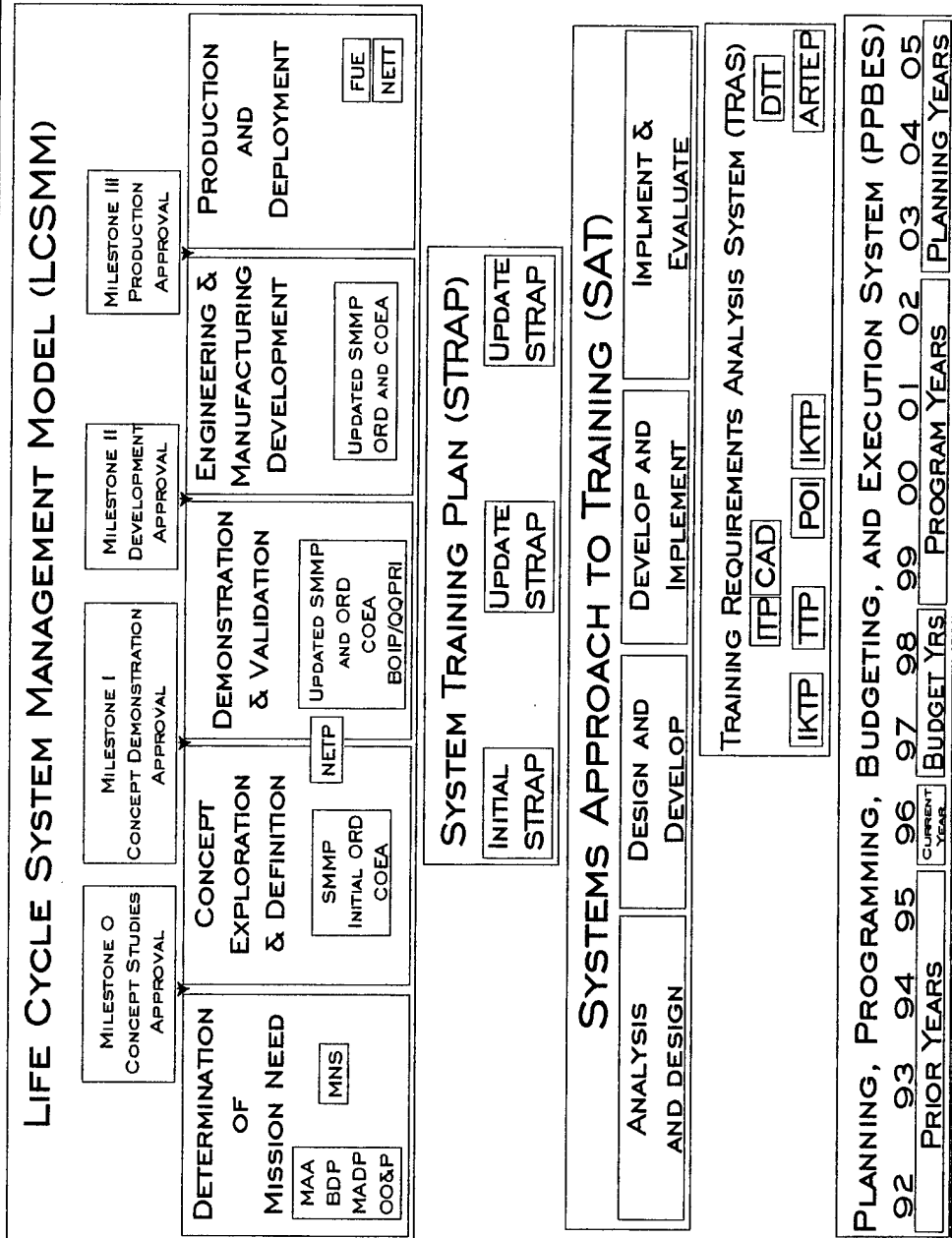


Figure 11. Training Development, Materiel Development, and PPBES Integration

VIII. SURVEY

A. INTRODUCTION

This chapter documents the results of the survey conducted to investigate questions and concerns not addressed in currently published training policy and procedure. The survey focussed on training development efficiency and effectiveness, neither of which can be adequately measured by simply examining the literature available. The external (world) environment and the internal (government streamlining efforts) environment in the Department of Defense are undergoing some of the most significant changes in modern history. The survey sought to capture the current problems and concerns experienced by Army training developers.

With assistance from the U.S. Army Armor Center CATS agency, the primary training development agencies directly responsible for institution, unit, and soldier training development were identified. These agencies (which numbered thirteen) were contacted telephonically and via e-mail, and all agreed to participate in the survey. Of the thirteen, eight responded in time to be included in this study.

Participants were guaranteed anonymity with regard to specific responses to ensure total candidness in the survey responses

B. SURVEY QUESTIONS

1. Workload

The following questions sought to evaluate the change in workload during the military drawdown:

- To what degree has the individual agency/office been reduced since Fiscal Year 1991 (i.e., what has been the percent of the personnel loss in a given agency)?
- To what extent have the number of weapon systems/projects been reduced during the same time period (i.e., what has been the percent reduction in workload)?

2. Utilization of Subject Matter Experts

The assumption behind the following questions was that military service members, in general, would have more recent and current experience with training issues and would thus add to the quality of the training development products. Specifically, service members with combat experience and in leadership positions with more continual contact with soldier training should provide the greatest level of Subject Matter Expertise. As officers and NCOs progress in rank, their daily, direct contact time with individual soldiers decreases; while at the same time, their experience and ability to manage unit training and evaluate the effectiveness of institutional training increases. Ideally, active duty service members in leadership positions beginning at squad leader through brigade commander would comprise the key range of the most effective training developers, as they are those leadership positions that most directly see first hand the results of training programs. The following questions sought to determine the staffing level of military service members within training development agencies.

- What percent of a given training development staff is current active duty, full-time military?
- What percent of a given training development staff is current National Guard or reservist?
- What percent of your training development staff are comprised of the following:
 - Brigade Commanders with combat experience;
 - Brigade Commanders with no combat experience;
 - Company Commanders with combat experience;
 - Company Commanders with no combat experience;
 - First Sergeants with combat experience;
 - First Sergeants with no combat experience;
 - Platoon Sergeants with combat experience;
 - Platoon Sergeants with no combat experience;
 - Squad Leaders with combat experience;
 - Squad Leaders with no combat experience.

3. Training Developer - Materiel Developer Interaction and Integration

The following question sought to evaluate the integration and interaction of training and materiel developers. Respondents were given the opportunity to select one of

seven descriptions that best reflected the training and materiel development integration/interaction. If a respondent felt that none of the descriptions reflected the situation, they were solicited to provide their own comments.

- How would you evaluate the sufficiency of Training Development & Materiel Development integration/interaction?
 - Excessive and ineffective
 - Excessive but effective
 - Ideal
 - Adequate
 - Lacking but useful
 - Lacking and ineffective
 - Nonexistent

4. Experience with Contractor-Provided Training Input

The following questions sought to evaluate commercial contractors' input to training development. Respondents were given the opportunity to select one of a number of descriptions that best reflected the commercial contractors' contribution to training development efforts. If a respondent felt that none of the descriptions reflected the situation, they were solicited to provide their own comments.

- With how many of the weapon systems/projects worked on by your office have you had experience where the commercial developer or contractor provided training development information or products?
 - None
 - Very Little
 - Some
 - About Half
 - Most
 - All
- To what degree did such contractor-provided training development information/products prove to be value-added to your efforts?
 - Vital to the success of the training development process
 - Very Helpful to the success of the training development process
 - Somewhat Helpful to the success of the training development process
 - Useless
 - Detracted from the quality of the training development process

5. Hindrances and Obstacles to Training Development

The following question sought to identify the greatest hindrances and obstacles to the training development process. Respondents were given the opportunity to select one of nine issues that best described the greatest hindrance to the training development process. If a respondent felt that none of the issues best described the situation, they were solicited to provide their own comments.

- What do you perceive to be the greatest hindrance to training development?
 - DoD Procedure/Regulations
 - DA Procedure/Regulations
 - Local Command Procedure/Regulations
 - Internal Procedures (inefficiencies within you office)
 - Manpower Strength
 - Manpower Experience
 - Manpower Turnover
 - Instability of Weapon System Programs/Projects (e.g., excessive changes, short & unforeseen suspenses, volatility of milestone event dates, etc. ...)
 - Manpower Turnover

C. SURVEY RESULTS

1. Workload

- To what degree has the individual agency/office been reduced since FY 91 (i.e. what is the percent of the personnel loss)?
- To what extent have the number of weapon systems/projects been reduced during the same time period (i.e. what is the percent reduction in workload)?

The personnel reduction level experienced by the surveyed training developers averaged 62%. The agency experiencing the highest personnel reduction suffered a 91% loss, and the lowest, a 17% loss. At the same time, only one agency reported a reduction in workload. That agency's reduction resulted in it no longer being required to develop training products for one system out of nearly 120 (i.e., a less than 1% reduction in workload). Two agencies reported increases in workload in that the number of systems they were required to provide training development for increased over the same time period. The remaining agencies gave no indication of any change in workload.

The following comments were submitted:

"We have actually added [systems] to the inventory without totally deleting anything because of foreign military sales and displacing equipment into the reserve components. However, weapons are not the only things important in the [training development] world. The advent of digitization and organizational changes also drive [training development] work requirements. Add to that the new TRADOC requirement for WARFIGHTER (collective) Training Support Packages and the overall workload for training developers has substantially increased while personnel to do the work have been decreased."

"We are eating our seed corn. As it stands right now, our man years of backlogged work is 2.5 times greater than our available man year capability."

2. Military Subject Matter Expertise

- What percent of a given training development staff is current active duty, full-time military?
- What percent of a given training development staff is current National Guard or reservist?
- What percent of your training development staff are comprised of the following:
 - Brigade Commanders with combat experience;
 - Brigade Commanders with no combat experience;
 - Company Commanders with combat experience;
 - Company Commanders with no combat experience;
 - First Sergeants with combat experience;
 - First Sergeants with no combat experience;
 - Platoon Sergeants with combat experience;
 - Platoon Sergeants with no combat experience;
 - Squad Leaders with combat experience;
 - Squad Leaders with no combat experience.

Training Development agencies staff were comprised of 52.75% active duty members on average. The most heavily military staffed agency was 77% active duty military, and the least reported having no military members whatsoever. National Guard and Reservists were far less represented. All but three agencies reported having no National Guard or Reservists on staff whatsoever. Of those that did, they reported having 5%, 8% and less than 1%, respectively, of their staff serving in the National Guard or

Most Training Development agencies did not have auditing systems in place to accurately track the former leadership positions held by military members. Although the survey asked for percentages, numbers reported by the agencies were too varied in format and accuracy to precisely identify the composition of military service members. In general (with one exception), the closer to actual combat the “users” of the training development products were required to potentially face, the higher the number of combat experienced leaders and military members there were in those agencies responsible for providing training development.

One comment from a training developer provided off-the-record stated that quality military members are generally difficult to assign to training development agencies. If an officer or NCO has established himself as a being on the proverbial “fast track,” there are simply too many competing interests, jobs, and senior leaders to attract the officer than the less-than-glamorous work developing training. Unofficially, the perception from both inside and outside the training development community is that training development work is considered to be a death knoll on an active duty member’s career.

Another agency commented that: “Drastic cut backs in TRADOC schools have reduced total SME strength. As a result, fewer soldiers are available to participate in training development efforts, IPRs, working groups, reviews, tests, training, and coordination.”

3. Training Development & Materiel Development

Integration/Interaction

- How would you evaluate the sufficiency of Training Development & Materiel Development integration/interaction?

All respondents described the integration and interaction of training developers and materiel developers as either “Adequate” (50%), “Lacking, but Useful” (37.5%), or “Excessive and Ineffective” (12.5%). The results are shown in Figure 12.

Training Developer - Materiel Developer Integration / Interaction

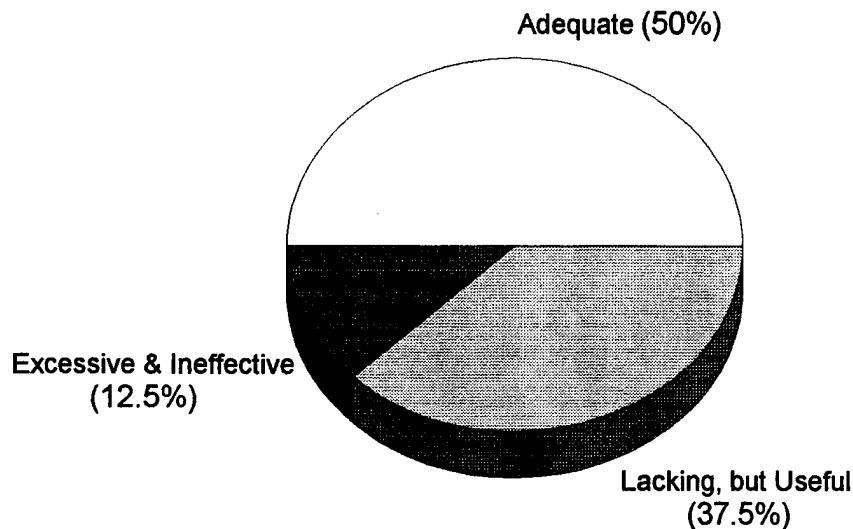


Figure 12. Training Developer - Materiel Developer Interaction (Survey Results).

Comments provided by respondents included the following:

"In the near future, I feel that we will see the result of the Army downsizing. With less training developer and SMEs [Subject Matter Experts], we will see the disconnects in training devices being developed by the Materiel Developer and what the soldier will need in the units to maintain and sustain their combat skills."

"Money controls the [training and materiel development] system...Introducing a new [weapon system] changes/updates all the [weapon system]'s proponent training products. However, there is no integration horizontally to ensure new [system] capabilities are integrated into other battlefield operating systems or even with maneuver [units]. Program Management money would buy this type of integration if required to, [but] currently this function is seen as a TRADOC responsibility with no resources."

"Have a real problem with combat/materiel developers not providing adequate funding for training development products. Training dollars always go first in a budget cut."

4. Commercial Contractor Input

- With how many of the weapon systems/projects worked on by your office have you had experience where the commercial developer or contractor provided training development information or products?

There was a wide response with regard to training development agencies receiving contractor-provided, informal information, and contractor-provided, formal training products. There was no indication of any correlation between the frequency of contractor support for training development products, and the quality of such support. In general, there were more agencies that received contractor-provided support informally (via information) than formally (via "final" training development products).

"Information" was categorized as being informal meetings, memos, telephonic contact, etc.; and training development agencies described such interaction as occurring for "most", "about half", "some", "very little", or "none" of their programs. "Products" were categorized as being formal training plans, documents, books, instructions, etc., and training development agencies described receiving those items for "most", "about half", "some", or "none" of their programs. Figures 13 and 14 depict the percentage of agencies that experienced varying levels of contractor-provided support for their corresponding training development programs.

**Percent of Agencies Were "Most", "About Half",
"Some", "Very Little", or "None" of Their
Programs Received Contractor-Provided
Information**

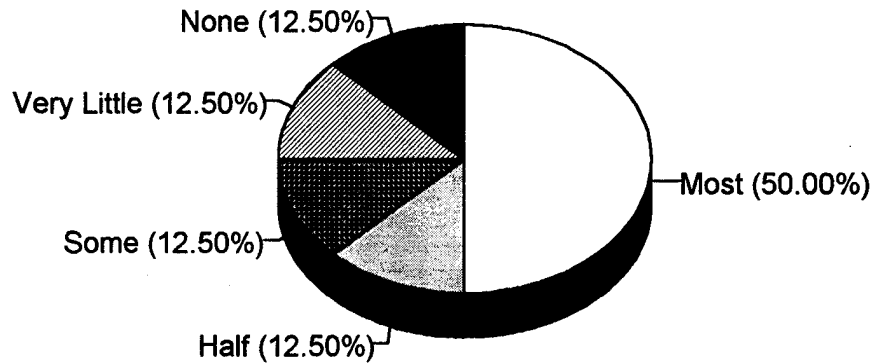


Figure 13. Experience with Contractor-provided Info (Survey Results).

**Percent of Agencies Where "Most", "About Half",
"Some", or "None" of their Programs Received
Contractor-Provided Products**

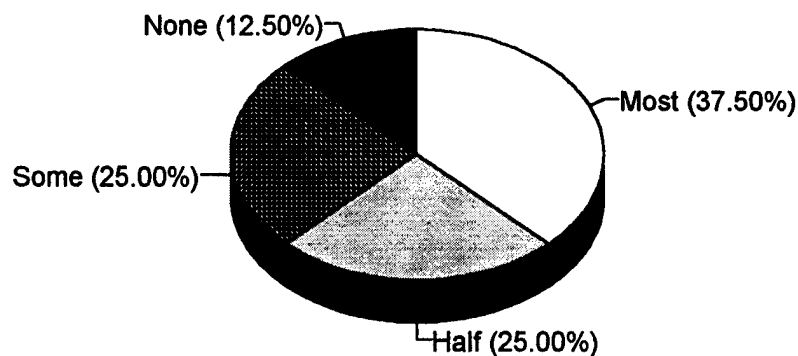


Figure 14. Experience with Contractor-provided Products (Survey Results).

The following comments were submitted by the surveyed agencies:

“Most products delivered by the contractors are not to government standards, which is a waste of money because the training developer will need to rewrite [them] into [the] correct format. This could be corrected if the materiel developer or contracting officer representative would monitor the development process [more closely].”

“Typically, contractors are former military with senior command experience (at the battalion or brigade). Unfortunately, the current and near term materiel capabilities which are being introduced into the Army are digital and there are no SMEs to hire to develop these products.”

“Products to support training are usually a part of the contract. Most training [contributions] provided are good, but require some review and reformatting to comply with TRADOC standards.”

5. Value of Contractor-Provided Support

- To what degree did such contractor-provided training development information/products prove to be value-added to your efforts?

Contractor-provided information and contractor-provided products were defined previously in subsection 4. Those definitions still apply within the context of this survey question, with the respondents' answers depicted in Figures 15 and 16.

Value of Contractor-Provided Information

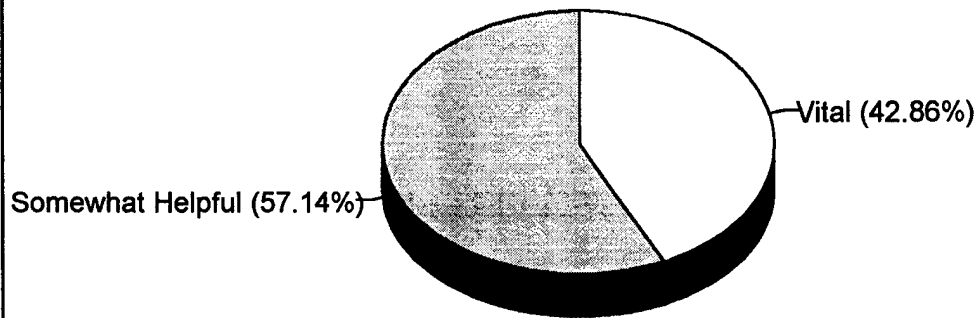


Figure 15. Value of Contractor-provided Information (Survey Results).

Value of Contractor-Provided Training Products

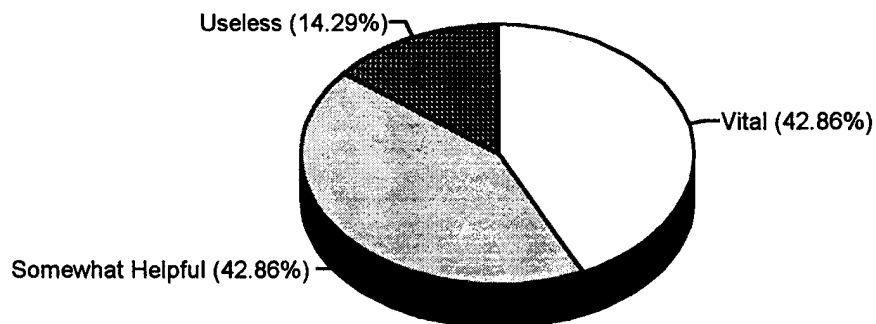


Figure 16. Value of Contractor-provided Products (Survey Results).

The following comments were submitted by surveyed agencies:

“Former battalion and brigade commanders [hired by the contractor to provide training development information and products] provide validity to peers, contemporaries, and senior leaders. Unfortunately, validity does not guarantee logic or truth.”

“We are requiring contractors to develop the training on most programs now. However, they are only one step above useless. We are being required to do way too much oversight of their efforts to get the training program and materials we want.”

5. Training Development Obstacles and Hindrances

- What do you perceive to be the greatest hindrance to training development?

Without exception, every surveyed agency cited manpower issues as their biggest hindrance to performing their job. The specific manpower issues cited (strength, turnover, and experience) by the various agencies are depicted in Figure 17.

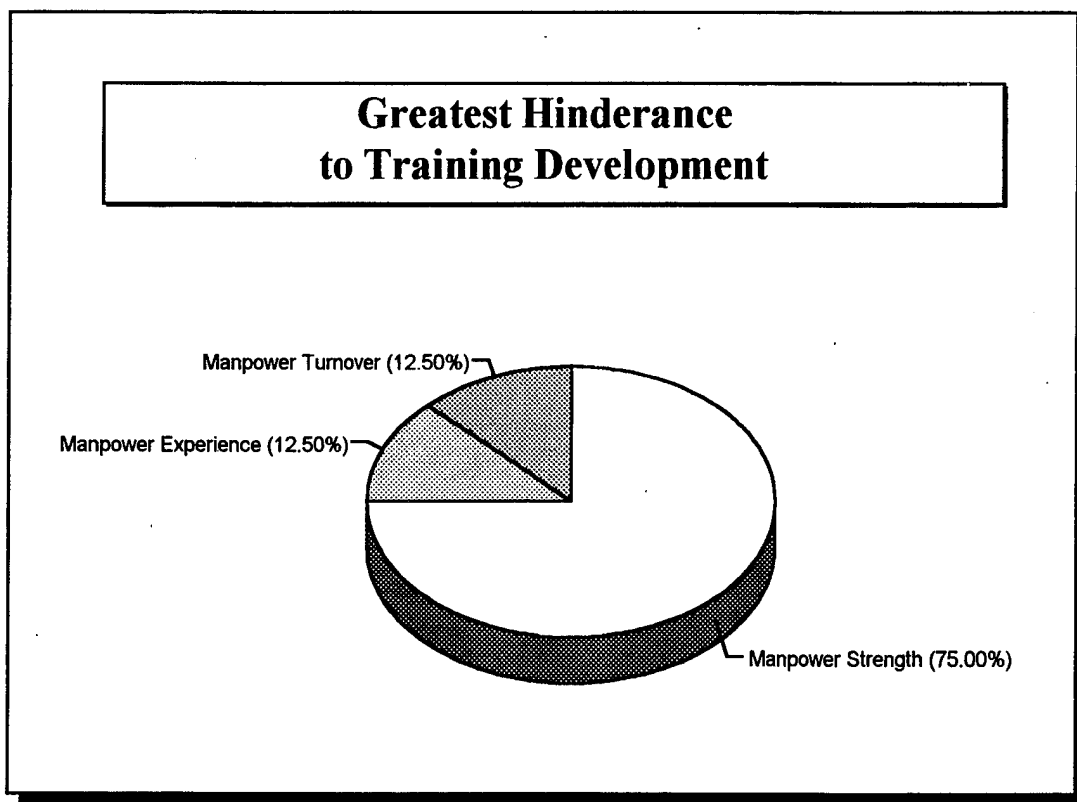


Figure 17. Hindrances to Training Development (Survey Results).

The following comments were submitted in reference to manpower problems:

"...with very limited resources you can sustain only so many initiatives."

"In a time of strength build-down, we tend to focus on sustaining day-to-day operation at the expense of future planning and resourcing. New systems, and new system's training becomes almost a last priority with little or no resources to sustain important programs."

"...lack of the right experience, rank/grade, and years of service is [a significant hindrance]. For example, officer authorizations were almost eliminated from the training development's account leaving, at the worst case, only SSGs to write brigade level mission training plans."

D. SUMMARY

The survey revealed that the training development community is facing radical changes in its workforce to workload ratio. The evidence clearly revealed a deep, and widespread belief by training developers that quality training development is in jeopardy. The case can certainly be made that this is indeed the situation. Such personnel reductions absent of workload reductions reflects that there is either ignorance on the part of the decision makers responsible for such cuts, or there is a belief by the same decision makers that such agencies were "sandbagging" their workforce to begin with. The problem is that given the long lead time in developing training products, the results of such personnel cuts will not be realized until years later. Imprudent radical cuts will ultimately surface as poorly developed training packages (that places the success of its corresponding weapon system in jeopardy), or a "burned-out" training development workforce, neither of which is a desirable situation.

Quality, and in some cases quantity, of properly experienced military members assigned to training development agencies was a *somewhat* lesser issue. Ideally, the best designers of training programs would be those successful NCOs and officers who have had combat leadership experience. However, the best candidate for virtually any job in the military are those successful NCOs and officers who have had combat leadership

experience. There are simply too many competing, high profile, "fast track" jobs seeking those service members. Until DA promotion policy clearly establishes and provides for some kind of favorable consideration for officers and NCOs assigned to training development positions, this problem will always remain.

Utilization of contractor-provided training development support revealed varied experiences and satisfaction with the contractors' efforts. In retrospect, it would have provided a better analysis to have also investigated the level of oversight and interaction a given training development agency conducted with their respective contractors. Such an investigation would have revealed a potential correlation between higher levels of oversight/interaction with higher levels of contractor performance. In any case, there is evidence that contractor-provided training development support could present a viable alternative to overworked Army training development staffs.

SURVEY SUMMARY

Survey Questions	Agency 1	Agency 2	Agency 3	Agency 4	Agency 5	Agency 6	Agency 7	Agency 8
Workforce Reduction	91%	17%	75%	71%	65%	60%	42%	75%
Workload Decrease	Added 3 Systems	No change Indicated	Lost only 1 System	No change Indicated	Unspecified Increase	No change Indicated	No change Indicated	No change Indicated
% of Staff Active Duty	70%	50%	40%	60%	77%	0	50%	67%
% of Staff Nat'l Guard	<1%	0	0	0	0	0	5%	8%
% of Staff of that was:								
<i>Bn Cdr - No Combat</i>	1							
<i>Co Cdr - No Combat</i>	3	9%					5%	16%
<i>Co Cdr - Combat</i>					15%	15%	2%	8%
<i>ISG - No Combat</i>	2	9%			3%		25%	
<i>ISG - Combat</i>					7%	45%	5%	8%
<i>Plt Sgt - No Combat</i>	2	47%	100%	60%	27%		35%	8%
<i>Plt Sgt - Combat</i>					33%	40%	10%	8%
<i>Sqd Ldr - No Combat</i>	6	18%	100%		50%		18%	24%
<i>Sqd Ldr - Combat</i>					50%		10%	8%
Tng Dev - Mat Dev Interaction/Integration	Adequate	Adequate	Excessive & Ineffective	Lacking, but Useful	Adequate	Adequate	Lacking, but Useful	Lacking, but Useful
# Programs where Kr provided Information	Most	About Half	None	Most	Some	Most	Most	Very Little
# Programs where Kr provided Products	Half	Half	None	Most	Some	Most	Most	Some
Value of Kr-provided Information	Somewhat Helpful	Vital		Vital	Vital	Somewhat Helpful	Somewhat Helpful	Somewhat Helpful
Value of Kr-provided Products	Somewhat Helpful	Vital		Vital	Vital	Somewhat Helpful	Somewhat Helpful	Useless
Greatest Hindrance to Training Development	Manpower Strength	Manpower Turnover	Manpower Experience	Manpower Strength	Manpower Strength	Manpower Strength	Manpower Strength	Manpower Strength

Table 5. Survey Summary

IX. POTENTIAL SOLUTION METHODS

A. INTRODUCTION

This chapter presents two potential methods to help alleviate a key problem that was discovered during the survey analysis. If there is any single problem experienced by the majority of training development agencies in the Army today, it is this: workload exceeds work resources. There are a number of ways this problem can be approached, and each of them will be briefly discussed with respect to viability.

- Workload can be reduced. It is beyond the authority of training developers to simply stop work on training development for any one system. It is also impractical for the Army to reverse the decision of a Mission Needs Statement of a given system simply because it is too much work to conduct the training development.
- Work Resources can be increased. Again, it is beyond the authority or resource capabilities of training developers to hire the needed manpower to achieve parity with their workload. Ideally, TRADOC would recognize the manpower shortfall and act accordingly. However, it is unlikely that TRADOC would simply increase the manpower levels in training development agencies because TRADOC, like most other military agencies, is reducing its workforce. TRADOC is no doubt having problems hearing the individual plaintiff wail of an individual agency amongst a chorus of the overworked. However, there is also a civilian, nongovernment entity that *can* perform training development-- the contractor.
- Work can be managed more efficiently. Training developers are doubtlessly looking for ways to increase their efficiency. The Armor CATS agency in particular was proactive in quickly recognizing the necessity of developing a more efficient means of managing their myriad of document and project suspenses given forthcoming personnel reductions.

The two potential solutions this chapter presents involves utilization of contractor provided training development to ease the workload burden, and the employment of automation to increase agency efficiency by relieving agency personnel of the repetitive, yet time consuming, manual task of suspense management. Each of these potential solutions will be discussed in the following two main sections.

B. CONTRACTOR PROVIDED TRAINING DEVELOPMENT

1. Introduction

Military training is unique to civilian-styled educational systems. Even amongst and between services, the training methods, regulations, and documents are varied. Each service also has its own methods of developing the training required to teach its soldiers, sailors, and airmen their wartime crafts. Traditionally, weapon systems have been developed and built by commercial contractors who follow the performance or design specifications set forth by the military.

The training development process, however, is a nearly reversed process of the materiel development, whereby the contractor directly or indirectly provides the military training developer with the operational characteristics and specifications of the newly developed equipment, and the military in turn translates this information into its service-specific training procedures documented by its service-specific manuals. In the Army, the materiel item's development falls under the command of the Acquisition Corps, whereas its training development is controlled by the Training and Doctrine Command. This section will examine how training development could potentially be addressed and handled with a commercial contractor for a new materiel item.

2. Background

The Combined Arms Training Strategies (CATS) agencies in the Army are primarily responsible for developing training products for new materiel items. Within the scope of this section we will consider new materiel items to be those that are primarily operated by enlisted soldiers specifically trained to operate the equipment, having undergone basic training, advanced individual training, and sustainment training.

CATS agencies are functionally aligned with a given Army branch or function (Armor, Artillery, Infantry, Communications, Aviation, etc.). Each CATS agency works closely with materiel developers (i.e. the Acquisition Corps), but their "real" boss lies within the Training and Doctrine Command (TRADOC) command chain. TRADOC's published doctrine, which will dictate how a new operational capability will be employed, is used simultaneously by both the Acquisition Corps to build the item and the

CATS agencies to identify and develop the training guidance and documents necessary to ensure the item can be used and maintained by soldiers. The success of any given new piece of equipment is often a synergistic result of good training development and good materiel item development.

Although a CATS agency is primarily concerned with the initial training requirements to ensure that a system passes the critical Operational Test and Evaluation (where the system is tested with *real* soldiers from *real* units utilizing CATS-developed training plans and packages), the CATS agency's training development efforts follow over into the post-deployment phase of the equipment fielding as well. Inherently, their analysis of the task, condition, and standards necessary to operate and manage the use of the equipment forms the basis for all *future* training and operation of the equipment. Generations of soldiers (as measured by rank advancement) will utilize and depend on the CATS agencies early efforts to formulate skill development and training programs throughout the operational life of a given weapon system.

With the military drawdown, CATS agencies have found themselves being an easy target for personnel reductions. As shown in the survey from Chapter 8, training development agencies have experienced a 62% reduction in personnel strength on average since fiscal year 91 and may be facing more reductions in the near future. Yet at the same time, the number of systems they are required to develop (or help develop) has, in general remained the same. How and why this personnel reduction came about is a moot point. The fact of the matter is that CATS agencies are now forced to work more efficiently and stretch their personnel resources as far as possible.

Training development must still be accomplished. But at the current level of reductions of the training developers coupled with the comparative level of immediate non-reductions of the materiel items, weapon systems success is at risk. How can the situation be corrected, or at least addressed? Though concerned with overall system, the Acquisition Corps lacks the resources to directly assume the complete training development mission. One alternative may be found in asking (or perhaps, requiring) the contractor to take an increasing role in developing the training package that accounts for the other 50% of the system's success.

Using a process that the Navy employed in a different project, combined with other Army training issues generated from other, "soft" procurements, this section will provide an outlined methodology that can be adapted for the Army's use of contractor-developed training.

The idea of not only requiring contractors to build weapon systems, but to develop the *complete* associated training packages that accompany their use, is a new one. There is virtually no documentation available that demonstrates any attempts (successful or not) to do so. There are however, documented instances of government procurement actions that involve "training only" contracts (where the item being procured was a training course or human trainer). And in the commercial world, it is not uncommon for contracts to include provisions for providing training for a procured system or piece of equipment. In the commercial examples, the contractor is given almost exclusively free reign to formulate the "mindware" aspect of training (i.e., the training methods, lesson plans, books, documents, etc; not including those items concerned with facilities or location).

In the face of diminishing training development assets, what we now should be considering, is to require the contractor to develop and produce a military-usable training package to the same degree and quality that we expect of him with the materiel item. Although such an action will require less actual training development from the training development side of the military, it will require more oversight on the part of the PM or PEO to ensure that the contractor is applying a proper level of attention and quality to the training side of his product. However, this oversight role could more easily be assumed by CATS agencies in lieu of their actual hands-on role in training development. In comparison to actually performing the "stubby pencil" work, such an oversight role might actually prove to help relieve CATS agencies of their increasing workload.

3. Methodology

The process that might prove to be most promising in managing and identifying the training development properties to commercial contractors involves decomposing the training development package into 12 work elements, or reports, that would comprise a

Contractor Training Development Plan (CTDP-- this is not a known acronym, it is one applicable to this paper only; and may God have mercy on my soul for possibly introducing a new acronym into the Acquisition process). The identification of these work elements is *not* analogous to the Work Breakdown Structure (WBS) involved in materiel development. In this case, these "training" work elements could *lead* to the development of a training package, not comprise it. This training development system is based on the Navy's acquisition of a maintenance training program in 1977.

The work elements described to be described subsequently have been modified from a maintenance-specific training program into a *general* training development orientation. Now, as then, they could be required to be addressed by the contractor in the Invitation For Bid, Request for Proposal, and in the final contract itself, for a given weapon system. As long as the military contracting officer ensures that the areas are addressed, he can be relatively assured of achieving future success in the training development aspect of the contract, and more importantly, in the weapon system itself.

In any case, consideration of the 12 work elements should provide the PM or PEO maximum flexibility in the acquisition process of obtaining a satisfactory product from the commercial vendor. What this section proposes is a method to manage the contractual development of training using a previously established system as a baseline, adapting it to form a foundation or guideline that will allow sufficient flexibility for Army materiel and training developers to formulate a training package that meets the success of the materiel item.

4. Process Categories

The training elements are listed below. Each training element by itself is in actuality a process that is conducted to produce the final training development package.

- Conduct Performance Needs Analysis
- Conduct Constraints Analysis
- Identify Organization & Responsibilities
- Establish Information Database Directory
- Establish & Operate Training Library
- Identify Task Listing & Candidates for Instructional Systems Design

- Perform Task Analysis & Document Final Task Listing
- Formulate Supplementary Task Information
- Conduct Methods & Media Analysis
- Conduct Instructional Development and Preliminary Training Plan Testing
- Conduct Internal Evaluation and Training Plan Testing
- Coordinate for External Evaluation of Training Plan

These elements are logically broken down and *redescribed* (i.e., not retitled) in the five categories as follows:

- I. Preparatory Training Development Actions:
 - A. Determine the Necessary Performance Skills
 - B. Identify the Constraints of the Training Package
 - C. Determine the Organizations and Their Functions that Influence the Training Development Process
 - D. Develop a Detailed Point of Contact Database
 - E. Formulate the Architecture of an Information Library
- II. Task Analysis & Identification:
 - A. Analysis of Present and Needed Training Tasks
 - B. Decomposition of Tasks as Needed
- III. Teaching Methods & Analysis
 - A. Identification of Factors Affecting Task Performance
 - B. Identification of Training Methods, Means, and Media
- IV. Training Design: Instructional Development and preliminary training
- V. Quality Assurance
 - A. Initial Training Effectiveness Testing
 - B. Follow-on Training Effectiveness Testing.

The 12 work elements are grouped into five sections, or phases, that represent a logical flow in the development of understanding and formulating the CTDP. The Navy plan on which it was based had no such breakdown; the decomposition as described above and shown in Figure 18 represents a chronological, systematic process that builds to the complete design of a training plan. Note that the five areas comprise a functional

decomposition of the training development process. Each of the five Army phases as described will subsequently be discussed in detail.

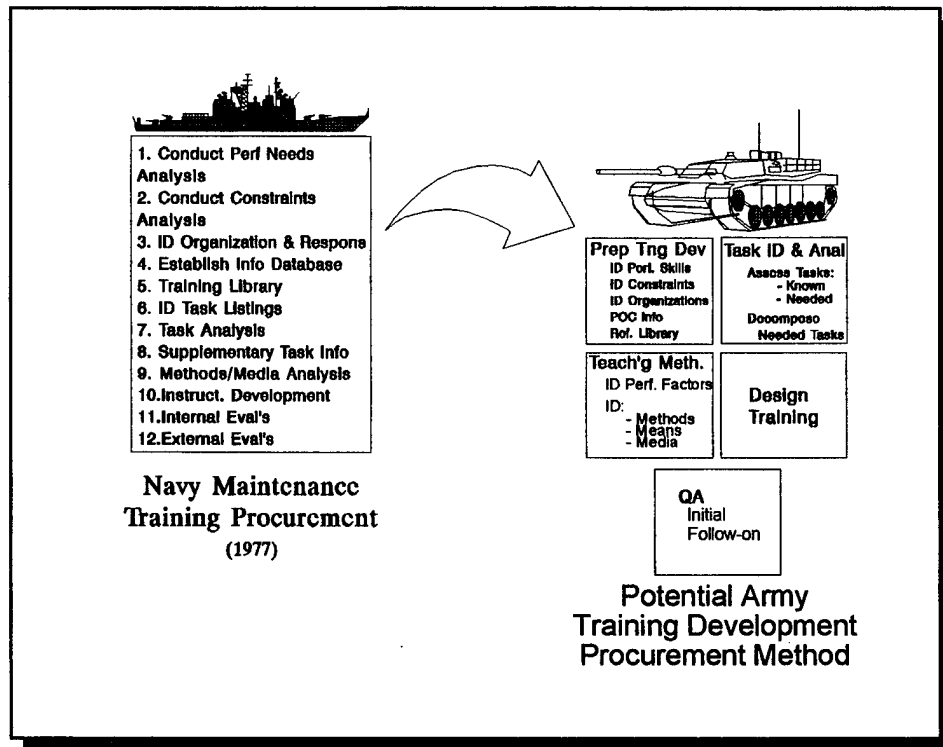


Figure 18. Adaption of the Navy Contractor-provided Training Model.

5. Phase 1 - Preparatory Training Development Actions

- Determine the Necessary Performance Skills (Performance Needs Analysis)
- Identify the Constraints of the Training Package (Constraints Analysis)
- Determine the Organizations and Their Functions that Influence the Training Development Process (Organization & Responsibilities Identification)
- Develop a Detailed Point of Contact Database (Information Database Directory Establishment)
- Formulate the Architecture of an Information Library (Training Library Establishment)

a. *Performance Needs Analysis*

The first training element, documented in the form of a report, can be called the "Performance Needs Analysis". This analysis summarizes the human skills needed to operate the weapon system in its intended environment. The report should present sufficient information to help estimate the scope of the skills training necessary to meet system requirements and guide the selection of subsequent training elements of the CTDP. Clearly, at this stage only estimates are possible. However, it is not too early to speculate about trainer requirements, facility construction, operational doctrine, training sites, and so on. If nothing else, the attempt to gather the information should identify key items of information missing or too vague to be useful. The vendor should also propose a review of ancestral system-specific training documents and procedures, as the success of the prior system was certainly influenced by prior training methods and processes.

b. *Constraints Analysis*

The second training element is a "Constraints Analysis" that identifies all constraints effecting the development of the CTDP. An adequate report would ensure a smooth insertion of the newly constructed training package into the existing Army training doctrine. The analysis at a minimum identifies, reviews, and describes the impact of all constraints (for example, policy, economics, manpower, etc.) affecting the development of the CTDP. A commercial vendor's response to this analysis should indicate an awareness of the differences between the service's documented policy requirements and the contractor's intentions and approaches to fulfilling his obligation.

c. *Organizations & Responsibilities Identification*

"Identification of Organizations and Responsibilities" is a logical extension of the previous training element. As an alternative, this training element and the previous one ("Constraints Analysis"), could be combined easily enough, with this report appearing as a section of the prior element. However, development of a CTDP is a cooperative effort among many agency offices within an Army Branch Center. As such is the case, the responsibility assigned to a head agency uncovered in the Constraints Analysis may not be an accurate reflection of the generated policy for that particular branch. The peculiarities and particulars of how a particular branch component is organized and

functions would be reflected in the contractor's Identification of Organizations and Responsibilities.

The purpose then of this training element (Identification of Organizations and Responsibilities) is to describe the organizational components and their responsibilities *as they exist* apart from the specified or directed policy of the Army in general. Consequently, some kind of interview process is required to adequately complete the report. A thoroughly defined training element here would permit everyone involved in the development of the CTDP to identify the actual perimeter of everyone else's role, delineating responsibilities, and assigning approval authority for various aspects of the training development. This establishment of "input and approval borders" will help to streamline the decision making process.

d. Information Database Directory Establishment

Establishing an "Information Database Directory" is the purpose of the fourth training element. This report provides an alphabetical listing of names, points of contact, addresses, and phone number for all agencies and offices involved in the development of the CTDP. As the scale of the matériel project grows, the importance of this training element does so also. The report will facilitate the flow of information among all concerned individuals. For this training element, the contractor's performance is measured by his understanding and grasp of the breadth of agencies involved as well as their subsequent function in providing input to the development process. Like the prior two elements, this one also may be combined with the previous one, as it is a natural progression from understanding not only who is involved in the project but how they can be reached.

e. Training Library Establishment

The fifth training element involves the "Establishment and Operation of the Training Library". Specifically, this report describes the procedure for establishing and operating a library to serve the information storage and retrieval needs of the training developers. This training element provides a greater potential return on investment than any other effort in the program. A central location for storage, retrieval, and channeling of information can save time, avoid duplication, and provide a means to anticipate

problems. The facility can serve the informational needs of both the service's representative as well as the contractor.

The physical facility selection is the least important consideration for this element. What is more important is the information collection and retrieval processes. An early, fundamental decision must be made about the role of the library within the program. A "passive" library largely stores and retrieves information on demand. An "active" library, on the other hand, participates directly in moving information through the system and monitoring the flow. The criteria to evaluate the adequacy of the contractor's response to this element are elusive, and as such, the measure of his success may be highly subjective. At a minimum, the contractor's response must fully describe the proposed procedure and criteria employed to determine the needs for, and uses of, the library.

6. Phase 2 - Tasks Analyses and Identification

- Analysis of Present and Needed Training Tasks
- Decomposition of Tasks as Needed

a. *Present and Needed Training Task Analysis*

With the definition of the sixth training element, we begin to get to the meat of the training development process. "Analysis of Present and Needed Training" breaks the performance tasks to be utilized by the new system into three different categories: 1) tasks where adequate current training exists, 2) current tasks requiring minor modification, and 3) tasks that require new training design. An adequate report prepared for this training element assures both that the user's subsequent effort avoids unnecessary training design and that useful, existing training services are identified.

If the first training element was done properly, information relevant to this effort may be available. If not, this effort starts by determining all weapon systems activities that require training. Existing training should be evaluated for adequacy in meeting both its own stated objectives and the training needs of the weapon system of concern. The last step involves matching existing training to the new system's training needs. Document reviews and interviews should form the basic techniques to gather information in this effort. The best approach includes direct interviews or mailed questionnaires to

solicit evaluations from graduates of the branch schools (the junior soldiers) and supervisors (the non-commissioned officers) of the graduates. Although our soldiers are the best educated of any generation of soldiers since, and could more than adequately respond articulately to written questions, the most effective method of conducting these surveys and questionnaires would certainly be to conduct on-site interviews were the weapon system is ultimately deployed.

A commercial contractor's response for this training element should specify how he will conduct the analysis, how he defines key words in the element (for example, "minor" modifications to training, "adequate" training, etc.) and what his assumptions are with regard to the training standards and levels of proficiency.

b. Task Decomposition

The seventh training element, "Decomposition of Tasks" might get confused with the previous one. This report provides a comprehensive and detailed task listing of all the performance tasks for which instructional design is required. It also describes the analytical procedures used to produce the list. It is essentially a systematic analysis and further decomposition of the previous training element. The conduct of the analysis and the resultant task listing is the objective of this training element.

Key here is the agreement between the government and the contractor as to both the scope of the analysis and its subsequent decomposition of tasks as well as the methods used to conduct the analysis. Additionally, both parties must agree to the organization of the task decomposition. Tasks could be listed and cross referenced according to rank, equipment, or mission. Once the major organizational dimension has been selected, the task listings will fall into a distinct hierarchical structure.

The most crucial issue however, is the level of detail for the task listings. The approach recommended here is to permit the users of the task listings to specify the required level of detail. The "supplementary information providers" and "instructional designers" (discussed in subsequent training elements) are the best authority for defining the level of detail necessary.

Contractors should be evaluated on this training element by how they've identified the deciding criteria for the level of detailed, specified, assumptions they hold

regarding the knowledge and skills the soldier is expected to have prior to starting a task, the order in which tasks are to be learned, and the organization of the task listing. Those evaluative criteria should reflect the contractor's understanding of the military training process and how he can best support it. The product of this effort is an organized outline of all tasks to be taught.

7. Phase 3 - Teaching Methods and Analysis

- Task Performance Factor Identification
- Training Methods, Means, and Media Identification

a. Task Performance Factor Identification

This eighth training element involves the formulation of supplementary task information, and consists of preparatory actions necessary to convert the detailed task listings into training syllabi, instructional outlines, or plans of instruction. Its objective is to provide the necessary supporting information for each listed task (from the previous element) to permit subsequent instructional design. The kind and amount of information addressed in this training element depends on the needs of the instructional designer. At a minimum, this training element should include the following:

- 1) A description of the soldiers performing the tasks (for example, rank, educational background, additional trained skills, etc.)
- 2) The conditions (environmental, available aids, reference manuals, tools, etc.) under which the tasks will be performed.
- 3) Cues and catalysts for starting, maintaining, and stopping the behavior involved in each task.
- 4) Evaluation criteria that distinguishes between success and failure for performing each task.

The government representative must ensure that each type of supplementary data collected be justified. The contractor's response should be to describe the intended use for all proposed data. If it can be shown that any data suggested for this training element are unnecessary, then the requirement supported by that data should be deleted.

b. Teaching Methods, Means, and Media Identification

The ninth training element is a "Methods and Media Analysis". As its title suggests, it reports and describes the strategy the contractor will employ to optimize its training through the use of various types of instruction as well as audio and visual aids. Matching the material to be trained to the best means to train and educate the military students is the objective of this training element.

The evaluation of the contractor's proposal in this area is highly subjective. As such, the government should be dubious of the contractor's ability to produce precise numbers reflecting the success or failure of specific training techniques. What counts is the contractor's ability to adequately explain and demonstrate the teaching methods and media he has proposed. Inevitably, the "richness" of his teaching methods will certainly reflect a trade-off between cost and thoroughness.

8. Phase 4 - Designing Training

Training element number ten is titled "Instructional Development and Preliminary Testing". This report will present the intended instructional program for each task or group of tasks. For each instructional program, a preliminary testing procedure will be described and applied. The instructional development specified for this training element is the focal point of the entire CTDP. In this element, the material to be taught is converted into training syllabi, instructional outlines, plans of instruction, or instructor's guides. The preliminary testing required is simply a safeguard to prevent extensive course construction without the control provided by frequent tests for adequacy.

Course development should follow without serious difficulty providing adequate task listings, sufficient supplementary information, and appropriate methods and media have all been developed properly by the contractor. The major problems to be expected lie in faulty assumptions about the soldier's background, capacity to learn, and motivation to learn.

The vendor's response should describe the general format of the training program and the proposed approach to the course design. The contractor should also demonstrate an awareness of the influence of policy, economic, and environmental constraints on his training design. A technically sophisticated training package is utterly useless when a

high school educated NCO has to train his soldiers in the mud, under a rain poncho using a "hip-pocket" manual during a field exercise-- and the contractor should demonstrate his understanding of such a situation.

9. Phase 5 - Quality Assurance

- Initial Training Effectiveness Testing (Internal Evaluation)
- Follow-on Training Effectiveness Testing (External Evaluation)

a. Internal Evaluation

At the completion of instructional development, the total CTDP must be evaluated. This is accomplished during the eleventh training element, "Internal Evaluation". Here the evaluation is conducted for the entire training program as it is presented to the initial sample of soldiers. The testers are the training designers and instructors. Ironically, the worst outcome of the evaluation is that the program successfully trains all soldiers. In this (probably rare) case, the designer has no way to determine how much unnecessary instruction is being provided. Hence, it is more reasonable to be satisfied with an evaluation which indicates a training program that comes close but falls *just* short of meeting its objectives. Correction of such a program will ensure a "just in time" (or strictly value-added) training resource that does not bore or waste trainees time.

The expectation the government should have with the contractor with this element, is that he has presented a complete description of the evaluative process of the training package, not that he has guaranteed its "first round" success. The people, the procedure, the data and its treatment and decision criteria for subsequent action should be described. The vendor's responses should be sufficiently complete to require only the actual collection of data to prepare the final report required for this training element.

b. External Evaluation

The final training element, "External Evaluation", addresses the procedures for, and the results of, an evaluation program. The evaluation will be conducted to test the effectiveness of the training program by observing performance of trained soldiers in the operational environment. Every training program can have only one legitimate goal. Namely, the program must prepare as many graduates as needed to

do something they could not do without the training experience. To ensure that the soldiers perform adequately, their performance must be tested in the environment where the performance is required.

Only such testing can provide valid data about the adequacy of the training program, and at the same time isolate needs for alterations, repair, or improvements. The objective of this training element is to plan and conduct the appropriate tests, evaluate the results and provide recommendations for change as required. The external evaluation is the single most appropriate source for identifying a need for change in the training program. Here, like the previous element, it is important that the contractor have a plan as to how he intends to accomplish the evaluation.

10. Summary

The successful application of contractor provided training development will be the result of a two-pronged effort. First, we (as the military representative) must identify the methods and means to identify to the contractor what he is to produce. Secondly, the contractor must establish an internal organization and capability to provide the training products we expect. As more and more contractors fall into the training development process, we should see a steady, and hopefully fast, rise in both the quality of the training development they provide as well as their compliance with service specific regulations and peculiarities.

The specifics of each of the training elements described above will vary depending on the maturing of the contracting process. Early on (during the IFB or RFP), the elements should reflect more of a strategy than a detailed answer. However, as the contract fully matures, the precise content of the information should also mature from process delineation to providing facts, data, and specified methods to be employed. These training elements are not "silver bullets" for future training development issues. Other potential problems not addressed in this section include the following:

- Conversion of civilian, technically oriented language, to military, "soldier-speak" training terms and processes.

- Accurately identifying the costs associated with developing training-- the ratio of human labor to material cost is far higher in developing mental processes than material items.
- Ensuring that the training development is tracking with the material development (accomplished through addressing the subject of agendas, conferences, and meetings in the commercial contract along with the training elements described above).

New equipment training has an immense impact on the initial operational capability of any system fielded. Contractors have not really been required to directly formulate the operational instructions for their developed piece of equipment into instantly usable training packages. But again, in the face of our diminishing training resources, we cannot afford to not require greater contractor involvement in the training development process.

C. SUSPENSE MANAGEMENT SYSTEM

1. Introduction

Early recognition of the workload versus work resource problem lead the 12 CATS agency to investigate potential methods to maximize their efficiency. Although the number of weapon systems that required their input for training development was reduced by less than 1%, they nonetheless were forced to take a personnel reduction of over 70%. Timely management of the various products they were responsible for providing became critical for ensuring the associated materiel programs were not delayed. Not being able to exert direct influence on improving the efficiency of receiving information (required staffing coordination, etc.) from the various agencies with whom they coordinated, the Armor CATS agency sought to at least improve their own internal efficiency.

Project management software appeared to initially offer the most promising solution. Such utilization of desktop automated resources would provide them the means to quickly analyze their entire workload and place their greatest effort where it is needed most and soonest. This section analyzes different potential strategies in the approach of employing desktop automation resources to increase the workload management of those

agencies that produce training development products over a wide range of varying programs. It offers a recommended automation methodology that could be adapted for use in a variety of configurations.

2. Solution Analysis - Selection of the Software Resource

The software options that were considered included the following:

- Use of Microsoft® (MS) Project™; currently operating in the Armor CATS agency;
- Use of a more sophisticated Project Management software package;
- Development of a proprietary, special program written specifically for the applied use;
- Use of available MS Office™ software currently operating in the CATS agency.

The advantages/disadvantages I considered in recommending the end solution are as follows:

a. Option A: Use of MS Project™

Although MS Project™ is one of the most economical and user friendly PM software packages on the market, it lacked the capability to “dynamically” reassign suspense dates. It also failed to provide a method to draw on historical precedence for suspense completions and workload variations (i.e., it provided no “database” with which to automatically provide more accurate future suspense forecasts). It was a good system for developing, tracking, and bringing visibility to the sub-activities of a given project when that project was unique in the steps to be taken. However, the real challenge facing the Armor CATS agency is “juggling” a vast number of systems following essentially the same path, but with a confusing array of suspense dates popping up continuously for different projects in different stages.

b. Option B: Use of a More Sophisticated Program Management (PM) Software Package

More sophisticated PM software packages are available, but at a substantially higher cost with an abundance of features that will in all likelihood not be utilized. Essentially, purchasing such a sophisticated PM software package does not

represent a cost effective option. One of the best packages costs around \$5000, and its publisher offers week-long seminars (not included in the purchase price) on how to operate it. Utilization of such a system would be analogous to selecting an M1 main battle tank to conduct pest control in a residence. Purchasing a sophisticated system, learning to use and maintain it is not likely a feasible solution given tighter budgetary and manpower constraints.

c. *Option C: Writing an Entirely New Program*

Although this would represent an ideal solution (in terms of the user's ability to specify in precise detail such things as user interface appearance, report formats, etc.), it also represents an inflexible solution should the document products or administrative process used in the current training development process change in any significant manner. Inherent with development of any specific, proprietary software package is the difficulty and expense in maintaining the software code for both standard code maintenance and inevitable program crashes. Besides training of in-house personnel on how the program works from a user's perspective, there is also the difficulty of ensuring that the program could grow and modify as the needs of a given agency change.

d. *Option D: Use of Existing, "4th Order" Software Packages (e.g. Excel™, Word™, dBase™, etc.)*

From a strict resource-purchasing perspective, this costs nothing (the software to be utilized is already present and operating in the office). From a training perspective, this costs little (there are probably enough personnel in a given office that are familiar enough with Excel™ and Windows™ that learning to use a suspense management system utilizing those packages would not take much more time). Maintenance and "code" adjustment of the system will require little work if that proves to be necessary. Utilization of Object Linking and Embedding (OLE) would provide a means to analyze, graph, present, and report the current and projected status of a given training development project, or collection of projects, using familiar software.

e. Option Selection

Option D (use of existing 4th Order software packages) was the recommended and accepted solution to management the document and event suspenses in the Armor CATS agency. The system uses MS Office™ software (i.e., Excel™, Access™, Word™, and PowerPoint™). An initial, “skeletal” version of the system was sent to the Armor CATS agency for comment and redirection of methodology as needed. Modifications to the system’s spreadsheets and interfaces were recommended by the 12 and are being incorporated into subsequent versions of the system. For the remained of this section the suspense management system that was developed will be referred to as MS-SMS (for Microsoft-based Suspense Management System).

3. Solution Methodology

a. Functional Overview

The general strategy behind MS-SMS’s functionality is illustrated and discussed as follows. The “system” consists of a spreadsheet file with three “worksheets” (using MS Excel™), and a database file (MS Access™). The database provides a more user-friendly data entry system and a more efficient means to sort information by document, weapon system, suspense date, etc..

Each “worksheet” serves a unique purpose:

- “Projections” assigns (forecasts) suspense dates to each of the various document products for a given program based on the “final due date” (i.e., FUE) & percentage of work or effort as established by historical precedence.
- “Completions” stores the dates of all completed document product actions.
- “Factors” uses historical completion dates to forecast future suspenses.

This functional overview is depicted in Figure 19.

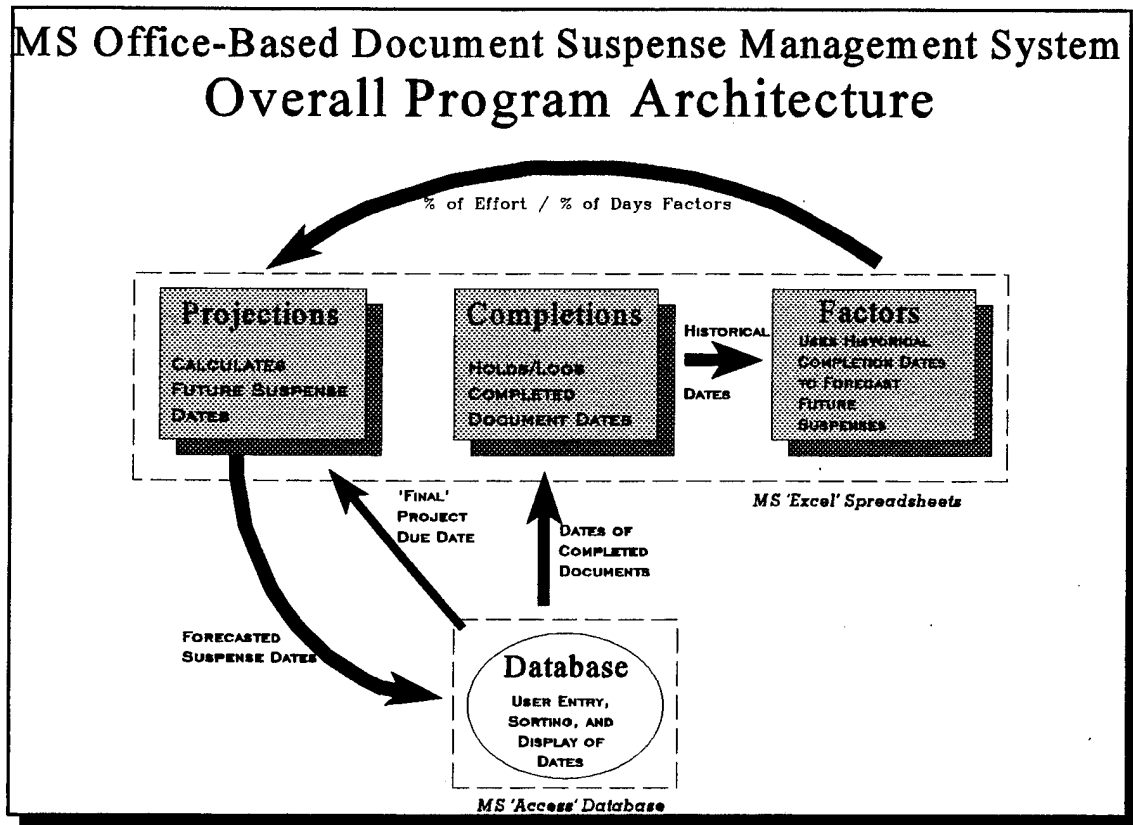


Figure 19. Document Suspense Management System Using Microsoft® Office.

b. System Development

The Armor CATS agency provided a manpower survey that documented the number of man days of work required for various training development products and events. The man days per system were totaled, and the man days per product or event were divided into the total system man days to derive percent of effort factors to determine supporting suspense dates. Then, using the date of the first suspense and FUE date, all other suspense dates were calculated.

4. Outstanding Modifications & Issues

The system as sent to the Armor Center for evaluation represents an initial, but functional, solution to the suspense management system they were looking to employ.

However, there are needed modifications to be performed to the overall system in order to ensure that the final product performs completely as desired.

a. Inconsistency of Requirements

Not all systems require all documentation. Deviation is normal for non-proponent systems. Other reasons for this deviation include Product Improvements (PIPs) of an existing system (versus complete development of a new system), and nondevelopmental items (NDI) including commercial, off-the-shelf (COTS) purchases of existing technology. Each of those categories of equipment could cause CATS agencies to skip steps or generate abbreviated input. However, many times those training development agencies know in advance that a system falls within one of those exceptions. One possible way to address those exceptions in the MS-SMS is to create three different categories of milestone systems (transparent to the MS-SMS user): full life-cycle development, non-proponent development, and NDI/COTS development. [Ref. 20]

b. Existence of Sub-suspenses

CATS agencies focus their suspenses upon major systems milestones (e.g., FUE date, MDRs, and major operational test dates). However, within the constraints of those major systems' milestones, CATS agencies can and do generate additional detailed suspenses and milestones. Major milestones are set by the PM with input from the combat developers and the testing community. Many of those major milestones are set from the initial phases of system development. To account for these additional sub-suspenses, the MS-SMS could be modified for further decomposition of documents and events. This would also entail that percentages of work supporting the parent suspense event also be defined. Such a deep decomposition of tasks would provide a highly detailed suspense system, but would also introduce a higher level of program complexity and increased difficulty for future MS-SMS modifications.

c. Need for Graphical and Textual Summary

Besides simply providing a list of suspense dates, the need for rapidly produced, textual and graphical summaries was also identified by the Armor CATS agency. Using Object Linking and Embedding (OLE) functions between word-processing

and graphical presentation packages, future updates to the program will provide a means for the agency to produce system summaries that reflect outstanding suspenses, and a graphical design that indicates past and potential trends in training development progress.

5. Summary

Use of automation resources is vital to training development efforts, especially given the level of personnel reductions now facing training development agencies throughout the Army. It should not, however, be left up solely to the training development agencies themselves to develop their own automation systems. The current commercial software market and robust software packages available today provide a ready, and economical means to tailor systems that greatly increase the efficiency and effectiveness of agencies in any setting. What is needed is a centralized effort to support the training development community.

D. CONCLUSION

This chapter outlined two possible methodologies for alleviating the work load versus work resource problem that seems to predominate training development agencies in the Army today. Training agencies have been forced to consider such options in reaction to unforeseen personnel reductions. Regardless of whether these specific options are employed, training development agencies will certainly be forced to find some kind of means to compensate for their radical restructuring.

X. CONCLUSION

A. THESIS SUMMARY

The thesis focussed on the United States Army training development process as it related to new materiel item development. It examined current processes and procedures used to develop and modify personnel training for both newly developed materiel items and equipment being modified or improved. The thesis sought to identify the timeliness, documents, procedures, and milestones necessary for training development of corresponding materiel items.

The study examined available Army regulations and guidance, to include policy developed and used exclusively at the U.S. Army Armor Center, to ascertain the precise training-specific documents, milestones, objectives, and goals essential for supporting successful acquisition programs through training development efforts. As described, the training development process has specific documentation, control, and staffing procedures that exist throughout the life of a training development project.

This literature examination generated questions regarding the efficiency and effectiveness of the training development process. These questions were translated into a training development survey which was used to poll various training development agencies. The survey revealed key concerns within the training development community primarily regarding workload issues.

Using these concerns as a basis for further research, the thesis concluded by presenting two potential methodologies that could help relieve the excessive workload being felt by training developers. The first method involved greater utilization of contractor-provided training development products. The second method addressed maximizing the efficiency of internal administrative processes within training development agencies by greater utilization of automation resources.

B. CONCLUSIONS

The training development process is a complicated, highly iterative, staffing intensive process. Whether or not the current training development process is *ideally*

suited to meet the training development needs of materiel development efforts remains unclear and is outside the scope of this thesis. However, the long-lead time in training development processes are clearly not compatible with current streamlining efforts. Moreover, there was no evidence that any efforts were being made towards the goal of streamlining the training development process. This situation coupled with radical changes in the workforce to workload ratio, will most certainly yield noticeable reductions in the quality and timeliness of training development products for future weapon systems.

There is also no evidence of a prescribed training development agency configuration; and in the conduct of the survey, there existed a relatively wide variety of titles and governing directorates under which training development agencies were located. One agency was about to be almost totally eliminated in favor of "training development outsourcing." The outsourcing action plan had not yet been completely defined, but it had been decided that commercial entities would conduct the training development activities normally accomplished by the school's training directorate.

There is an inconsistency in logic behind the organizational structure that defines the relationship the training development community shares with materiel and combat developers. The Army Acquisition Corps is the professional community under which acquisition and procurement efforts for new materiel items are accomplished. The program management offices and contracting offices responsible for such activities fall under the Army Materiel Command (AMC). The training development agencies that develop training products for these same materiel items fall under the command of the Training and Doctrine Command (TRADOC). Training development agencies support the *general* mission of TRADOC, but *directly* support the mission of AMC with regard to the *specific* development of new materiel items. Survey respondents cited examples both where the training development community was drastically cut in personnel strength, and faced budgetary problems because of their non-materiel relationship with various programs.

It would seem then, that the most logical situation would be one where training development agencies supporting new materiel items be moved from under the command

of TRADOC, and be placed under the command of AMC within Program Executive Offices (PEOs) to support the wide variety of programs a PEO must manage. As it stands now, training development agencies perform that function of supporting a variety of programs that generally fall under the same or similar PEO agencies. Such a change in structure would allow PEOs to more directly manage their own resources with respect to training development, but would also possibly require more direct oversight of such activities. In any case, there should be (or rather should have been) some kind of staffing coordination conducted prior to downsizing those entities that ultimately affect the success of the weapon systems' programs throughout the Army.

C. RESEARCH QUESTIONS

1. Primary Research Question

How is training development currently integrated into/with materiel development? In other words, how does a proponent accomplish training development concurrently with materiel development and does the process have the potential to achieve greater efficiency?

Training development is integrated through, with, and by the Systems Approach to Training (SAT), the Training Requirements Analysis System (TRAS), and the Combined Arms Training Strategy (CATS) agencies, throughout the life of a materiel items development beginning with the publishing of the Operational Requirements Document and ending with any follow-up action required after First Unit Equipped (FUE). Training development interaction occurs within the Life Cycle Systems Management Model concurrently with materiel development as discussed in detail, and graphically summarized by Figure 11, in Chapter VII.

The training development process must be highly iterative, and at times repetitive because it *follows* the materiel system's development and must react to that program's changes and progress. The materiel system development drives the training development process. Logically, this makes sense, as it is impossible to develop training if the materiel item being training for has not yet been maturely developed.

As to efficiency, any "system" has the potential to be more efficient. The fact that there exists many training development agency configurations and methods implies that "ultimate" efficient training development system has yet to be found. However, there are actions that each agency can take to make their administrative tasks more efficient. One example of that possibility was presented in Chapter 9 through the use of automation resources.

2. Subsidiary Research Questions

- a. *What is the "optimal" point to address various training issues with respect to the life cycle of a given materiel development item?***

There are numerous issues, concerns, and requirements for a fully developed training program that must be addressed throughout the life of a materiel item. Chapter 7, Section E, outlines the specific training issues and analyses that must be conducted during different stages of a materiel item's development.

- b. *How can commercial contractors provide more assistance in the training development process?***

Contractors can be requested or required (through the structure of the contract) to provide military-ready training packages that support the materiel item. Chapter 9 outlines a potential methodology for addressing such activities.

- c. *To what extent has the personnel strength been reduced in training development organizations in TRADOC and how (if at all) has this affected the timeliness, efficiency, and quality of their work?***

Personnel reductions have cut deeply into the training development community, averaging 62% with surveyed agencies, with reductions as high as 91% in one agency. No immediate affects have been documented as of yet, but expectation are that there will be.

d. Has the number of materiel development items decreased proportionally to the decrease in training developers?

Only one surveyed agency reported a reduction in their workload, one of less than 1%. All other agencies reported increases or no changes to their workload with respect the number of materiel items they supported with training development products.

D. AREAS FOR FURTHER RESEARCH

- Streamlining efforts in training development.
- Comparative Analysis of Organizational Efficiency amongst different training development agencies.
- Operation Test and Evaluation Failures due to Training Development Shortcomings.
- Effectiveness of Contractor-Provided Training Development for New Materiel Items.

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